New Climate War | Praising Uncertainty | *Invisible Women* | Atheists Sadder? | King Arthur | Lizzie Borden

Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

Vol. 44 No. 2 | March/April 2020

BEWARE THE NATUROPATHIC CANCER Quack

BRITT HERMES

Her Personal Story of Naturopathy Quackery

CONFERENCE REPORT

CSICON Las Vegas 2019

Celebrating Science & Skepticism

Climate Models: How Good?

Dubious Claims in Youth Psychotherapy II

The Flying Disc Problem of 1947

INTRODUCTORY PRICE U.S. and Canada $5.99

04

0 09281 02614 3

Committee for Skeptical Inquiry
"... promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims."

[FROM THE EDITOR

Conversions, Courage, and Climate

Conversion stories—from people who held unsubstantiated beliefs but changed their minds—are a powerful tool for skeptics. It makes sense that a former believer in a pseudoscience who publicly renounces that belief can be more persuasive to many people than the rest of us who may have been harping about it for years. The unique power of conversion stories has even been tested recently in a scientific paper that we wrote about this past year (Scott Lilienfeld's "Skepticism and the Persuasive Power of Conversion Stories," May/June 2019).

In this issue, we present one of the most powerful conversion stories in the skeptic community in recent years. Britt Hermes begins her candid personal story with these words, "Six years ago, I was a quack." She was a naturopath and thought she was as much of a doctor as real physicians. Then she noticed she and others were prescribing an unapproved drug. She saw that some patients were being put at risk or even harmed. She quit and quickly became an outspoken campaigner against naturopathy. She tells that story in human terms here.

Courage is probably a too little appreciated aspect of scientific skepticism. (We think it is key; notice "courage" is listed prominently among "our values," at the bottom of this page.) Britt Hermes has courage. She suffered an intense legal action against her. She prevailed. She won. She continues her outspoken effort to protect the public from quackery. In 2018, she was awarded the John Maddox Prize for courage in promoting science and evidence on matters of public interest. She spoke at CSICon 2019, and we are proud to present her story in this issue.

Michael Mann likewise has courage. The noted climate scientist has been incessantly attacked for years by those who wish the evidence he helped accumulate about our warming planet weren't true. In this issue, he offers a commentary about the "new climate war," the latest "softer" tactics opponents of climate science are using (making individuals feel guilty), and how we might win the climate war. He laments the left's "doomism," which paralyzes action. Other contributors consider climate issues from different perspectives. In a feature article, noted climate scientist Tom M.L. Wigley assesses the accuracy of climate models, including his, going back thirty years. And in our news and comment section, we report on a new study assessing the accuracy of climate models going back *fifty* years. Both Wigley and the new study find them to have been pretty darn good. In Wigley's words, climate scientists' predictions have been "remarkably accurate." In his column on science communication, Matthew C. Nisbet writes thoughtfully about his attempt to be a "mindful" climate writer, to calmly assess evidence without being continually buffeted between extreme elements. In the meantime, wildfires have raged over an overheated Australia (p. 7), and in mid-January, two U.S. agencies (NOAA and NASA) reported that the decade that just ended was the hottest measured on earth since records began and perhaps the hottest in the past 11,500 years since before the dawn of civilization. Each decade since the 1980s has been hotter than the previous decade. Notice a trend here? Scientists see no end to it.

Our coverage of CSICon 2019 on science and skepticism in Las Vegas takes up a fair part of this issue. It was large and lively. The courage I mentioned before was evident. There's even one more conversion story. I hope you'll peruse our short descriptions of some talks. For more about each presentation, check Skeptical Inquirer's Facebook page (or the Center for Inquiry's website), where videos of individual talks are being posted.

—Kendrick Frazier

Skeptical Inquirer™
THE MAGAZINE FOR SCIENCE AND REASON

EDITOR Kendrick Frazier
DEPUTY EDITOR Benjamin Radford
MANAGING EDITOR Julia Lavarnway
ASSISTANT EDITOR Nicole Scott
ART DIRECTOR Christopher Fix
WEBMASTER Marc Kreidler
PUBLISHER'S REPRESENTATIVE Barry Karr

EDITORIAL BOARD James E. Alcock, Harriet Hall, Ray Hyman, Scott O. Lilienfeld, Elizabeth Loftus, Joe Nickell, Steven Novella, Amardeo Sarma, Eugenie C. Scott, Karen Stollznow, David E. Thomas, Leonard Tramiel

CONSULTING EDITORS Susan J. Blackmore, Kenneth L. Feder, Barry Karr, E.C. Krupp, Jay M. Pasachoff, Richard Wiseman

CONTRIBUTING EDITORS Harriet Hall, David Morrison, Matthew C. Nisbet, Massimo Pigliucci, David E. Thomas, Stuart Vyse

Published in association with
CENTER FOR INQUIRY

CHAIR Edward Tabash
PRESIDENT AND CEO Robyn E. Blumner
CHIEF FINANCIAL OFFICER Barry Karr
CORPORATE COUNSEL Nicholas J. Little, Brenton Ver Ploeg
SUBSCRIPTION DATA MANAGER Jacalyn Mohr
COMMUNICATIONS DIRECTOR Paul Fidalgo
DIRECTOR OF LIBRARIES Timothy S. Binga
EXECUTIVE DIRECTOR, RICHARD DAWKINS FOUNDATION FOR REASON & SCIENCE Robyn E. Blumner
DIRECTOR OF DEVELOPMENT Connie Skingel
DIRECTOR, DIGITAL PRODUCT AND STRATEGY Marc Kreidler
DIRECTOR, GOVERNMENT AFFAIRS Jason Lemieux
SYSTEM ADMINISTRATOR Cody Hashman
DIRECTOR, TEACHER INSTITUTE FOR EVOLUTIONARY SCIENCE Bertha Vazquez

BOARD OF DIRECTORS Edward Tabash (chair), David Cowan, Richard Dawkins, Brian Engler, Kendrick Frazier, Barry A. Kosmin, Y. Sherry Sheng, Julia Sweeney, J. Anderson Thomson Jr., Leonard Tramiel. *Honorary:* Rebecca Newberger Goldstein, Susan Jacoby.

STAFF Pat Beauchamp, Melissa Braun, Matthew Cravatta, Lauren Foster, Roe Giambrone, Melissa Myers, Alexander Nicaise, Paul Paulin, Michael Powell, Vance Vigrass

cfi CENTER FOR INQUIRY

CFI Mission: The Center for Inquiry strives to foster a secular society based on reason, science, freedom of inquiry, and humanist values.
Our Vision: A world where people value evidence and critical thinking, where superstition and prejudice subside, and where science and compassion guide public policy.
Our Values: Integrity, Courage, Innovation, Empathy, Learning, and Wonder.

Skeptical Inquirer March/April 2020 | Vol. 44, No. 2

FEATURES

38
Beware the Naturopathic Cancer Quack

Naturopathic medicine is not any kind of medicine, and its practitioners are nothing short of quacks. I know because I used to be one. Herein lies my story.

BRITT M. HERMES

45
How Good Are Past Predictions of Global Warming?

Critics of climate science claim that climate models lack predictive skill. In fact, some of the earliest predictions made thirty years ago have performed remarkably well.

TOM M.L. WIGLEY

50
Dubious Claims in Psychotherapy for Youth Part II: Internalizing Issues

This is the second article in a three-part series about questionable ideas in child and adolescent psychotherapy. Topics in this installment relate to internalizing issues in youth and include naturopathic medicine for mania, dream interpretation for depression, fears about Bigfoot, superstitious rituals for anxiety, attachment parenting, and homeopathy for psychosis.

STEPHEN HUPP, BRITT HERMES, CALEB W. LACK, CAROL E. COLANINNO, STUART VYSE, AMY TUTEUR, AND MICHAEL MARSHALL

54
General Nathan F. Twining and the Flying Disc Problem of 1947

In 1947, the United States was dealing with reports of flying discs in its airspace. Were they a secret U.S. program or of foreign origin? General Nathan F. Twining signed a letter confirming the existence of the discs but admitted to not knowing their origin. Did the discs ever really exist?

ERIC WOJCIECHOWSKI

COMMENTARY

18
How to Win the New Climate War

MICHAEL E. MANN

CONFERENCE REPORT

8
From Fantasyland America to the Fabric of Space and Time: Celebrating Science and Probing Our Public Confusions

KENDRICK FRAZIER

SPECIAL REPORT

20
Believing in Science Is Not *Understanding* the Science: Brazilian Surveys

NATALIA PASTERNAK AND CARLOS ORSI

COLUMNS

FROM THE EDITOR
Conversions, Courage, and Climate 4

NEWS AND COMMENT
A Small Victory for Science in Suburban Philadelphia / 'Mysterious' Drones Sighted over Colorado / Record Heat Wave, Catastrophic Wildfires Hit Australia / Fifty-Year Performance of Climate Models: They Accurately Forecast Today's Global Warming 5

INVESTIGATIVE FILES
Lizzie Borden's Eighty-One Whacks: Table-Tipping Testimony from a Spirit?
JOE NICKELL 22

NOTES ON A STRANGE WORLD
King Arthur Found?
MASSIMO POLIDORO 26

REALITY IS THE BEST MEDICINE
In Praise of Uncertainty
HARRIET HALL 28

BEHAVIOR & BELIEF
Are Atheists Sadder but Wiser?
STUART VYSE 31

THE SCIENCE OF SCIENCE COMMUNICATION
The Mindful Climate Writer: Finding My Voice in a Culture of Extremes
MATTHEW C. NISBET 34

SKEPTICAL INQUIREE
Have I Ever Seen a Ghost?
BENJAMIN RADFORD 36

LETTERS TO THE EDITOR 65

REVIEWS

The Hidden Biases Men Just Don't See
CAROL TAVRIS 58
Invisible Women: Data Bias in a World Designed for Men
by Caroline Criado Perez

No War between Science and Religion? Many Scientists Disagree
HOWARD FELDMAN 60
The Warfare between Science and Religion: The Idea That Wouldn't Die
edited by Jeff Hardin, Ronald L. Numbers, and Ronald A. Binzley

Truth Matters, and the Scientific Attitude Helps Find It
HARRIET HALL 63
The Scientific Attitude: Defending Science from Denial, Fraud, and Pseudoscience
by Lee McIntyre

A Small Victory for Science in Suburban Philadelphia

Stuart Vyse

In December 2019 in a suburb of Philadelphia, science enjoyed a small but important victory over pseudoscience in autism treatment. James Gerl, an attorney and hearing officer in the Pennsylvania Office of Dispute Resolution, released his final decision in a dispute between the Lower Merion School District and the parents of a child in that district (ODR File Number 21855/18-18AS). The parents alleged that their child had been denied a free and appropriate education as required by law and sought reimbursement for a private educational program that they set up as a remedy for what they considered an inappropriate program at school.

The parents in the case believed their child should use spelling to communicate (S2C), a brand of rapid prompting method (RPM), which itself is a version of the wholly discredited facilitated communication (FC). As readers of Skeptical Inquirer may recall, FC is a communication method that involves a second person holding the hand of the disabled person as they type on a keyboard. Extensive double-blind testing has shown that the facilitator—not the disabled person—is responsible for the words typed on the keyboard, in an unconscious Ouija-like phenomenon. RPM and S2C involve the child pointing at a letter board held in the air by a "communication partner." Numerous professional and advocacy organizations have established policies opposing the use of FC, and the American Speech-Language-Hearing Association (www.asha.org) has released separate position statements against the use of FC and RPM. Nonetheless, both FC and its newer variant RPM remain popular with the parents of non-speaking autistic children (see "Autism Wars: Science Strikes Back," SI, November/December 2018).

The case in the Lower Merion School District was apparently hard fought and, at times, quite emotional. According to Gerl's written decision, the case generated

growingkidstherapy.com

The parents believed their child should use spelling to communicate, a version of the wholly discredited facilitated communication.

"documents and witness testimony rivaling the *IBM v. Xerox* litigation," and the student's special education teacher was described as "clearly pained to be testifying against the family whom he testified that he loved." Nonetheless, the hearing officer's decision was clear. Gerl found that the school district had provided a free and appropriate education for the child and that the family was not entitled to reimbursement for the private program that they set up.

This was a complete win for science, but the school system went to great lengths to consider the parents' concerns. The parents arranged for a staff member from Growing Kids Therapy Center of Herndon, Virginia—the promoters of S2C—to train teachers from the school system in the method. However, after being trained, the "special education teacher and autistic support teacher, who had frequently worked with the student in the classroom, were not able to get the student to give clear answers using S2C methodology."

Both sides in the dispute acknowledged that there was no research supporting the effectiveness of S2C, and the hearing officer reported that the witnesses for the school department were more credible than those called on the parents' behalf. In the end, the facts were clear, and Gerl made an evidence-based decision.

Stuart Vyse is a psychologist and an SI contributing editor and columnist.

‘Mysterious’ Drones Sighted over Colorado

Benjamin Radford

As 2019 came to a close, news reports spread about nearly two dozen “mysterious” drones sighted in the night skies over rural Colorado and Nebraska. Despite the (presumed) drones apparently operating legally under Federal Aviation Administration (FAA) regulations (and not, for example, at a high altitude or near an airport or government buildings) authorities launched investigations. Concerned—and/or annoyed—residents asked if it was legal to shoot the drones down and were told it was not a good idea; it is considered an aircraft and someone else’s property. Still, people were understandably unnerved.

Of course, most drones are, strictly speaking, “unidentified” unless launched in a public place, such as a park, where someone is seen watching or controlling the drone. Otherwise, they’re just anonymous mechanical craft hovering or flying overhead, devoid of clear identifying marks. Various explanations have been offered, ranging from the malicious to the mundane, but so far no companies or individuals have come forward to claim responsibility for the reports.

A few videos have circulated of the lights, none of which actually reflect the most dramatic descriptions. Instead of dozens of huge drones with “six-foot wingspans” flying in formation (as some have reported), they merely show one to a few lights somewhere in the sky. Reliably estimating size, speed, and distance of lights or objects in the sky is extremely difficult under the best of circumstances; doing so at night is even more fraught. Social and psychological factors are certainly at play as well, as the history of so-called UFO flaps teaches us. When people’s attention is drawn to the sky, especially in service of looking for anything potentially strange or unidentified, they are likely to see what they’re looking for—whether it exists or not. It’s entirely possible that identical drone flights occurred in other places around the same time but went unnoticed.

This is not to suggest that people are imagining the lights; there are indeed many lights in the night sky, including those from satellites, stars, planets, planes, meteors, the International Space Station, military flares (the provable source of several notable UFO sightings), helicopters, and, of course, drones.

So what are people seeing? Many probably *are* drones, which after all are widely used by journalists, photographers, police, railways, the National Oceanic and Atmospheric Administration (NOAA), surveyors, Amazon.com, the military, and so on—and are increasingly popular with hobbyists. There is unlikely to be a single blanket explanation for all the reports, which were seen in different places by different people at different times. The most likely explanation is that people are seeing a variety of things, all being lumped together by the news media and mystery mongers, into a terribly mysterious—and possibly nefarious—event.

On January 13, 2020, the Colorado Department of Public Safety issued an update on its investigation. It stated, “To date, CDPS has confirmed no incidents involving criminal activity, nor have investigations substantiated reports of suspicious or illegal drone activity.” The department identified twenty-three reports in field investigations spanning January 6 to 13; of those, over half (thirteen) were “determined to be planets, stars or small hobbyist drones not meeting the [eyewitness] descriptions of large wingspan drones traveling in groups”; six were commercial aircraft or atmospheric conditions; and in four cases police confirmed the sightings but could not identify the operators.

Almost exactly one year earlier there were reports of phantom—and possibly nonexistent—drones appearing in the skies near London’s Gatwick airport. Hundreds of flights were cancelled or delayed, affecting over 100,000 passengers, when unidentified drones were spotted in the airport airspace between December 19 and 21. England’s second-busiest airport was closed for about thirty-three hours. Two people were arrested and later released in connection to the reports, having been cleared of any wrongdoing. Despite an extensive investigation by several aviation and law enforcement agencies (and a reward of over $65,000 for information), no explanation was found and it’s not clear how many, if any, of the sightings were of unidentified drones.

Benjamin Radford is the deputy editor of the Skeptical Inquirer.

Record Heat Wave, Catastrophic Wildfires Hit Australia

Our special report "Hot Month, Hot Year, Hot Planet" in our November/December 2019 issue noted that while Northern Hemisphere residents would probably welcome the forthcoming winter, our friends in Australia might well be dreading their impending summer (2019–2020).

That happened fast.

A heat wave hit Australia in December 2019, echoing those of previous recent summers there. But this one was even more intense: Australia recorded its hottest day on record on December 17, 2019, the Australian Bureau of Meteorology said. The average temperature across the country that day was 105.6° F, beating the old record of 104° F on January 17, 2013.

A heat wave hit Australia in December 2019, echoing those of previous recent summers there. But this one was even more intense.

"This hot air mass is so extensive, the preliminary figures show that yesterday [December 17, 2019] was the hottest day on record in Australia, beating out the previous record from 2013, and this heat will only intensify," bureau meteorologist Diana Eadie said in a video statement on December 18, 2019. On that same day, temperatures soared to 118° F in Birdsville, Queensland, and 116° in Mandora, Western Australia. Bush fires fanned by the high temperatures

were creating health problems for many Australians. On December 19, 2019, New South Wales—Australia's most populous state—declared a seven-day state of emergency as the heat fanned roughly a hundred wildfires. Central Sydney reached a temperature of 102° F, and the outer suburbs reached 108°. Smoke blanketed the city. Air quality levels ranged from poor to hazardous.

By early January, it was a national emergency. Hundreds of wildfires were burning all around the continent. Army, navy, and air force reservists were called out to help. Some evacuations had to be made from sea. Smoke shrouded major cities. Animals died. More than 12.35 million acres of land had burned, with at least seventeen people dead and more than 1,300 homes destroyed.

Eight of Australia's top ten warmest years have occurred since 2005, and 2019 is likely to join that list.

Fifty-Year Performance of Climate Models: They Accurately Forecast Today's Global Warming

In a feature article in this issue, veteran climate scientist Tom M.L. Wigley evaluates the performance of climate models—two of them his own—asking how the models' predictions made thirty years ago stand up today. They have performed remarkably well, he concludes; they've stood the test of time.

Now a new study has been published evaluating the predictive performance of climate models all the way back fifty years, when the models were then still rudimentary. The conclusions are similar: Even fifty-year-old climate models, basic as they were, correctly predicted current global warming.

The researchers compared annual average surface temperatures across the earth today to the surface temperatures predicted in seventeen forecasts drawn from fourteen separate computer models released between 1970 and 2001. Most of the models accurately predicted recent global surface temperature observations. For ten forecasts, there was no statistically significant difference between their output and historic observations.

The findings are published in the December 4, 2019, *Geophysical Research Letters* ("Evaluating the Performance of Past Climate Model Projections") by Zeke Hausfather of UC Berkeley, Henri Drake of MIT and Woods Hole Oceanographic Institution, Tristan Abbot of MIT, and Gavin Schmidt of NASA Goddard Institute for Space Studies.

"We find that climate models published over the past five decades were generally quite accurate in predicting global warming in the years after publication, particularly when accounting for difference between modeled and actual changes in atmospheric CO_2 and other climate drivers," the authors wrote in their paper. "This research should help resolve public confusion around the performance of past climate modeling efforts, and increases our confidence that models are accurate projecting global warming."

—K.F.

From Fantasyland America to the Fabric of Space and Time

Celebrating Science and Probing Our Public Confusions

KENDRICK FRAZIER

Photos by Brian Engler

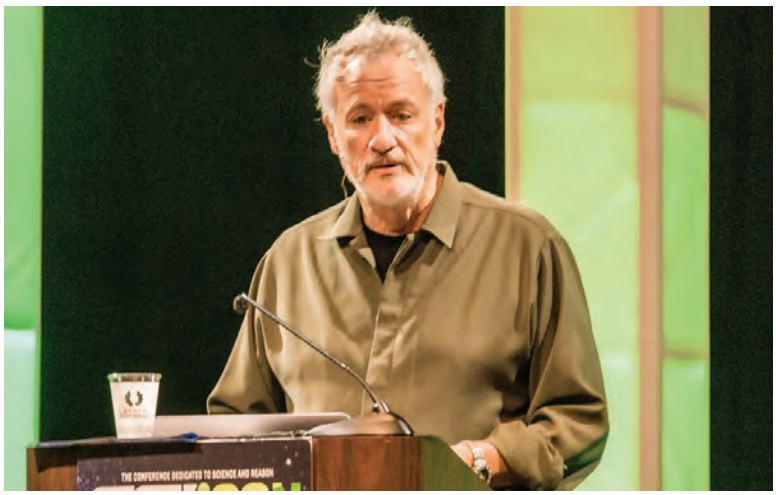
CSICON Las Vegas 2019

It began with a penetrating look at the long history of how a troubled America went haywire by *Fantasyland* author Kurt Andersen and ended with a romp through the nature of space and time—and the mind-bending speculation that we all might live in a holographic universe—from Columbia University cosmologist and author Brian Greene.

From Thursday evening to noon on Sunday, it was like this: Speaker after speaker delivering mind-expanding talks about everything from fake news and junk science and fact-checker Snopes to how the brain learns and sometimes gets things wrong to how evolution works and also sometimes gets things wrong. From looking for aliens to concerns about our unfounded fears of chemicals. From the pseudoscience of naturopathy to the fictional aspects of memory. From winning the climate war to fighting the heart-rending nonsense of facilitated communication. From lamenting when our legal system supports pseudoscience to using our legal system to fight pseudoscience (especially homeopathy). From the many new "wellness" pseudosciences in which women are increasingly being taught to worry about mysterious, nonexistent toxins in their bodies to finding ways to enrich our own personal skeptical existence.

Amid it all came an eloquent and inspiring reminder in an afternoon lecture from Richard Dawkins of how we should take courage from Darwin and an amazing illustrated talk by a poised, confident thirteen-year-old skeptic named Bailey Harris, speaking to the capacity audience about writing her kids' books (e.g., *My Name Is Stardust*)

Thirteen-year-old activist Bailey Harris shows off one of the children's books she has authored.



Actor John de Lancie speaks out on knowing versus believing.

extolling science and naturalism. Plus *Star Trek: The Next Generation* actor John de Lancie spoke passionately on his hope for a time when "*knowing* is more valued, more sought after, than *believing*."

It wasn't all serious. Standup comedian Leighann Lord hosted with a light touch, ready wit, and some provocative questions ("What if Adam was made from Eve's rib?"). Piff the Magic Dragon (resident entertainer at the Flamingo Hotel in Las Vegas, where the conference was held) brought some skeptical magic and refreshing silliness. Comedian and irreverent freethinker Julia Sweeney entertained with part of her one-woman stage show *Older & Wider*. The great skeptic mentalist Banachek delivered another great evening magic show. And skeptic icon James Randi attended the sessions and greeted fans and well-wishers in the hallways.

Whatever questions and concerns you might have about dealing with misinformation, pseudoscience, and pseudomedicine … whatever famous scientific skeptics you might want to hear and meet … whatever books you might seek … whatever skeptical entertainment you might delight in … here it was all wrapped up in one conference.

Even when the formal program ended there was still more, as the Sunday Papers session of shorter presentations gave us talks on why flat-earthers believe, what the harm is in belief in psychics, national polls of public perceptions of science in Brazil, and how 30 percent of college students in a beginning course in child and family science considered themselves experts—before the course had even begun!

CSICon 2019, the annual conference on science and skepticism hosted by the Center for Inquiry (CFI) and its Committee for Skeptical Inquiry (publishers of the Skeptical Inquirer), took over the ballroom and hallways of the Flamingo Resort in Las Vegas from October 16–20, 2019. Scientists, researchers, skeptics, and investigators raised, discussed, and argued important questions about all manner of scientific (mis)understandings and public confusions. If they couldn't always offer solutions to the problems they probed, they did often offer constructive advice. Total attendance was 646, numbers that caused runs on the coffee at breaks but frequent opportunities to interact in person in the hallways and bookroom.

"Hearing from the top people in their fields with energetic talks on ripped-from-the-headlines topics is what makes CSICon stand out from other skepticism conferences," says Robyn E. Blumner, CFI's CEO and president. "And this year was no

Physicist and cosmologist Brian Greene takes the audience on a romp through space and time.

CSICon 2019 host and emcee Leighann Lord

According to author Kurt Andersen, the United States is "different and extreme in the breadth and depth of our embrace of fantasies."

Kurt Andersen on how America went haywire and our "fantasy/industrial complex."

"Our capacity to think is not the culprit," Gordon Pennycook said. "It is the solution." He said we all need "pseudo-profound bullshit detectors."

Center for Inquiry CEO and President Robyn E. Blumner welcomes the crowd.

different. When talks can make this audience of prove-it-to-me skeptics stand and cheer or laugh until they cry, you know it's something extraordinary. Come to CSICon 2020 and see for yourself!"

Videos of selected talks can be seen online on Skeptical Inquirer*'s Facebook page and CFI's website (see https://centerforinquiry.org/video/). Some talks will be adapted for publication in future issues of* Skeptical Inquirer*. That's already true for Britt Marie Hermes's feature article and climatologist Michael E. Mann's commentary in this issue. What follows are highlights from just a few of the other presentations.*

Fantasyland America

Kurt Andersen, author of *Fantasyland: How America Went Haywire*, began with some of the 500-year history his insightful 2017 book portrays. He finds America troublingly special: "We are different and extreme in the breadth and depth of our embrace of fantasies." The current U.S. president had, by last count in August, made 12,019 false claims, but "Post-factual or post-truth America did not start with Trump. Donald Trump just took advantage of our propensity."

He noted the conservative political operative Karl Rove proudly boasted, "We create our own reality," and it is true that America has done that countless times over the centuries. It all stems from America's historic "extreme antagonism to the establishment." That, Andersen said, "Gives us permission to dream up new realities." This includes religious fervor, back to the time of The Great Delirium of around 1835, when as deToqueville noted, "Religious insanity is very common in the United States."

We've long had a "Fantasy-Industrial Complex," going back to P.T. Barnum, the *New York Sun*'s famous hoax about telescopes seeing people on the moon, and Buffalo Bill, a real frontiersman-turned-entertainer, in his popular wild west shows. All of them were a mixture of fact and fiction.

"Most of U.S. history has been a dynamic balance between fantasists and realists," Andersen said. At least most of the time "the grown ups were in charge," but the past half century has seen an explosion of magical thinking and "a permissive exposure to various flavors of the untrue."

Mainstream used to be a good thing, but now the term has been turned into a pejorative. We have fallen into "cascades of fantasm" and "spectacular make-believe and fantasy."

The Second Great Delirium came in the 1960s and 1970s, when we were taught that our own ideas have priority: "Whatever we think is true *is*

true." Charles Reich and others taught that science is just a social construct, that it is just stories.

Soon after came "the X-Filing of America," popularizing ideas from *The X-Files* fictional television series that conspiracies are all around us and that paranormal and supernatural events are part of our reality. Then came the digital revolution with its billions of websites, too many of them filled with "fantasists galore" and grandiose assertions that "look like facts." Here falsehoods become validated. Then we have reality TV series, "an amalgram of pseudodrama and melodrama."

Most of this is just for popular entertainment and consumption, but there is a dark side. "The problem," Andersen said, "is when delusional thinking floods into the public sphere." Delusional thinking now pervades many topics: Satanic panics, gun regulations, conspiracies, climate change, vaccines, GMOs, elections, and governance.

"Our fantasyland tendencies have been there since the beginning," but in recent decades, Andersen lamented, they have made "a horrible swerve." Is the swerve permanent or just a phase? It is too early to tell.

Andersen ended by espousing his own bumpersticker call for action: "Make America Reality-Based Again."

An audience member, perhaps a bit depressed by all Andersen had described, asked him how to fix the problem. Andersen at first seemed lost for how to respond but then did. "We hope for the best," he said. "Call B.S. on B.S. ... Maybe we can not be as squishy as we have been. ... Maybe we can stop it from becoming worse."

Pseudo-Profound B.S.

Gordon Pennycook draws upon his work as an assistant professor of psychology at the University of Regina to research why people fall for B.S. in this age of misinformation we live in. By the way, he points out that the use of the term in academic circles goes back to philosopher Harry G. Frankfurt's 2005 book *On Bullshit* published by none other than Princeton University Press. Modern examples of major bullshitters include Dr. Oz of daytime television fame, Gwyneth Paltrow and her company Goop and its jade eggs and other bogus products (a business now worth $250 million), and Deepak Chopra, the guru of mind and body. "Bullshit sells," Pennycook said, and that was a major theme of his CSICon talk. He proposed four premises: 1. B.S. is a problem. 2. There is a market for it. It sells. 3. We can't expect it to stop, because there is a market for it. 4. It is up to us to inoculate ourselves from B.S.

James "The Amazing" Randi (left) with his husband, Deyvi.

Gordon Pennycook on B.S. in this age of misinformation.

As we were reminded in Janyce Boynton's talk, repeated controlled tests have shown that it is the facilitator, not the patient, making the choices in facilitated communication.

Julia Sweeney, Richard Dawkins, Robyn E. Blumner, Brian Greene, and John de Lancie at a VIP luncheon.

According to Jeff Hawkins, false brain models can occur, especially when we "omit contrary facts, introduce false facts, and teach alternate reference frames."

Physician Jen Gunter on the global wellness industry's pseudoscience targeting women.

Fake news is a special kind of B.S. Pennycook displayed a chart showing the rising number of completely fabricated headlines from nonmainstream media as the 2016 presidential election progressed.

Some of the appeal is due to errors in human reasoning, but that's not the whole problem. We are all "good lawyers," he said, good at arguing to a preconceived conclusion. "We are very good at that," he said. But we are not so good at thinking like a philosopher (or a scientist), judiciously weighing both sides of an issue and trying to come to an objective conclusion. "We are *not* good at that."

He pointed to Daniel Kahan's research at Yale University showing that we are motivated to believe misinformation. This "motivated reasoning" allows people to be "better at convincing themselves of what they want to be true."

Some have despaired that we have found that intelligent people are better at arguing to a given conclusion (their own) than getting to the objective truth, but Pennycook says there is good news: Research shows that people who are better at reasoning are better able to detect false news. "Reasoning actually helps."

"Our capacity to think is not the culprit," he said. "It is the solution." He said we all need "pseudo-profound bullshit detectors."

To solve the problem of fake news, we need to encourage people not to act so quickly when they read something sensational online. Don't just forward it on. Think about it first.

"We need to get people to stop and think. It actually helps."

The Foibles of FC

Janyce Boynton took the audience on a tour of the strange practice of facilitated communication (FC), totally debunked in 1994 but still widely used by those working with young people who have autism or other profound language deficits. Though they often now call it "supported typing," it is still the same old pseudoscience. It all comes down to "who's doing the pointing" to the letters on a keyboard. Repeated controlled tests have shown that it is the facilitator, not the patient, making the choices. The trouble is, said Boynton, a former speech/language clinician who was originally a believer, FC is being used to make major life decisions related to health, education, housing, and relationships, including marriage and sex. "It is time to admit that FC is about the facilitator, not the people with disabilities," she said.

She believes that most FC facilitators are well meaning; "they are just caught up in a belief sys-

tem." The belief that it "could" work leads them to the belief that it "will" work. It's all at an unconscious level. Facilitators are taught not to test for influencing. Of course when tests have been done, the FC conversations stop. We need mandatory testing, she emphasizes.

Our Brain Models the World

Jeff Hawkins, who does basic and applied research in neuroscience at his research company Numenta, gave a tour of the brain—how it learns and why it sometimes gets things wrong. We have our "old brain" that takes care of breathing, walking, reflexes, balance, and emotions and the newer part of our brain, or neocortex, which takes up 70 percent of the volume and deals with conscious awareness, language, cognition, thought, and planning. "The relationships between these two parts of the brain explain much about human behavior," Hawkins said.

The neocortex learns a predictive model of the world. Everything you know is stored there. This allows you to plan and achieve goals. Prediction is how the models test themselves. "The brain's model is our belief system, and it can be wrong." All areas of the neocortex look basically the same, he said. It's what is connected to them that makes the difference—vision, hearing, language, etc. The brain wants to store knowledge in a reference frame, yet the same inputs can be arranged differently, "leading to different predictions and different beliefs." We are beginning to find that there are diverse columns in the neocortex, with most columns getting their input from other columns, not direct sensory input.

False models can occur, especially when we "omit contrary facts, introduce false facts, and teach alternate reference frames." These are all ways we can go wrong.

"The model is our reality. It is what we know and believe," said Hawkins. "We are beginning to understand how this model works. … I have a dream that every kid in high schools is taught about how our brains work and how they can be wrong," he said. The course could be called "The Science of Belief."

Women's Bodies as Toxic

Jen Gunter, an activist OB/GYN physician with a large online media presence, is targeting the global wellness industry, which she says has reached $4.2 trillion. One large, pseudoscientific aspect of it is making women think their bodies are filled with toxins that must be removed. There is generally no need for that, yet the marketing

Jeff Hawkins: "The brain's model is our belief system, and it can be wrong."

campaigns are filled with high-priced products supposed to do just that. Gwyneth Paltrow and her company Goop exploit the gaps left by modern medicine and are getting a pass from the media, Gunter lamented. She listed words we all give a pass to but shouldn't—*pure*, *natural*, *wholesome*, *clean*, *refresh*. She also listed words we don't give a pass to—*cancer*, *radiation*, *pain*. From the 1920s to today, women have been given the same message that they are filled with toxins, just different presentations of it.

The industry also fosters medical conspiracy theories: vaccines cause autism, anti-fluoridation, AIDS denialism, and that Wi-Fi reception via women's bras results in cancer. Belief in medical conspiracy theories also increases the chance you will buy supplements, another huge group of questionable products.

"Wellness" is a mish-mash of false idols—Marianne Williamson, Paltrow, and Oprah Winfrey are the three biggest ones, Gunter said. They are different, but where their messages overlap they have in common God, mysticism, and gurus. Mysticism is central, permeating it all into one "big religion." In this religion and belief system, there is no room for science.

Pseudoscience in the Law

Jann Bellamy, a Florida attorney concerned about bogus medical science (who blogs regularly for *Science-Based Medicine*), took on pseudoscience in the law, specifically the incorporation of pseudoscience into the law or, as she put it, "How legislatures take science and just toss it out the window." It happens all the time. Most often it is to enshrine some aspect of so-called alternative medicine with the spurious imprimatur of legislative approval. Licenses or accreditation authority is a typical route. Too many accrediting agencies don't require any science-based input, she lamented. That's great for naturopaths and chiropractors (the latter a $12 billion a year industry in the United States). "A system of self-licensing that is supposed to protect the public has instead become a threat to the public." Continuing education courses in alt-med fields are "an endless source of pseudoscience," and often they are publicly funded, meaning "taxpayers are helping fund education in pseudoscience." It all is a result of a "false equivalence of real medicine and false medicine."

Piff the Magic Dragon skeptically entertains the CSICon audience.

Courage in Science

The last chapter of Richard Dawkins's new book *Outgrowing God* is titled "Taking Courage from Science." For his CSICon talk (his first lecture at a CSICon, as opposed to extemporaneous on-stage conversations), the noted evolutionary biologist and author chose to speak about "Taking Courage from Darwin." It required courage on the part of Charles Darwin to publish his revolutionary theory of evolution by natural selection, "to fight the hubris of faith," in Dawkins's words. "Darwin had that courage."

We need to have some of that courage as well. Religious critics of science are always seeking to find gaps in the science where they can say God is the explanation. "But the trouble with gaps," noted Dawkins, "is that science has a way of filling them."

Theologians too often have a contempt for evidence, focusing more on "what feels right," Dawkins said. Yet pride in science is not hubris, he said; it is simple realism. "It is not hubris to state facts when they are secure."

We should take pride in what we *do* know and contemplate with humility what we don't know, he said.

Science loves to explore possible answers to the things we don't know. We can take inspiration from those quests to find answers to nature's most puzzling mysteries, among them, Dawkins noted, are "What is dark matter?" and "What is dark energy?" We may or may not soon find the answers, but the quest is ennobling.

What are the deepest problems for us? Dawkins cited at least four: Consciousness. Why are the laws of physics what they are? Why are the physical constants what they are? Why is there something rather than nothing?

Science at least has a shot at eventually answering these questions, he said, while "theology cannot answer them."

It takes intellectual courage to take on these kinds of questions. We should take courage from Darwin. "Darwin solved the big question," how species evolve, and it had a stunningly simple answer: natural selection. "The big problem has been solved by Darwin," he said.

These other quests take moral courage as well. Those morals arise from within us, Dawkins emphasized. He concluded with one such moral precept: "Leave the world better than you found it."

Thirteen-Year-Old Author and Activist

Bailey Harris astonished the CSICon audience—all in a good way. She's just thirteen years old, but this confident, enthusiastic, and articulate young woman stood at the front of the stage and delivered an amazing illustrated talk about her passion about science and her early rejection of religion. She was raised in Utah to secular parents, so science and independent thinking were second nature to her from the beginning.

When she was eight years old, she watched *Cosmos: A Space-Time Odyssey* in which Neil deGrasse Tyson talked about how we are all star-stuff. She loved it. "I went straight upstairs and started typing my book," she says. That has led to her *Stardust* series of books for young people. (*Stardust Explores Earth's Wonders* is her latest, in 2019.)

And she doesn't just write; she also has a big social media presence (now as "Bailey Stardust") and appears all over the country advocating for science education, equality, and atheism. Why? She explains, "Religion is always fighting science education and quality. That's crazy!" She is active in the Secular Student Alliance, and she is clearly one of our youngest bright stars fighting for science, skepticism, and freethought.

Hermes's Courageous Journey

Britt Marie Hermes told the moving story of her conversion from all-accepting naturopathic "physician" to skeptical activist working to expose naturopathy as dangerous quackery. She relates that story in her own words elsewhere in this issue (see "Beware the Naturopathic Cancer Quack," p. 38), so we won't do more here than touch on it. She lamented naturopathy's "aggressive and relentless lobbying" to Congress to establish a system of self-regulation, using the argument that if the field is regulated (even by its own bogus practitioners), the public will be safe. But it's all an illusion, and she presented statistics showing the risk of death was twice as high under one naturopath's therapy. She described her legal case in which she was sued to stop saying bad things about naturopaths, even though she had the evidence on her side. In May 2017, a court in Germany ruled entirely in her favor. Although this news is generally known, the CSICon audience nevertheless cheered. The deadline for appeals has now expired and so, she proclaimed, "I have officially won!"

A fund drive led by the Australian Skeptics raised 50,000 euros in five days for her defense, and in all a total of 100,000 euros was amassed. This was more than her legal defense required, and so the balance is going into an International Skeptics Legal Defense Fund that she has established for defending skeptics against future legal actions meant to stop their investigations.

She said she has found the worldwide skeptic community amazingly supportive. That has made her realize something: "Skeptics are not lone wolves. We are a tight pack and family."

Britt Marie Hermes on her conversion from naturopath to outspoken skeptical activist.

Climate Change and Soft Denial

Noted climate scientist Michael E. Mann returned to CSICon and spoke to a lunchtime audience about the evolution of opposition to climate change.

The impacts of climate change are playing out before us in real time as heat waves, floods, more temperature extremes, worse droughts, and massive wildfires. "We are getting huge weather anomalies that are remarkably consistent." Climate models are underestimating these events, he said. "Climate scientists aren't alarmists," he said. "They have been too conservative." The evidence indicates that for every degree Fahrenheit increase in temperature, we get a 7 percent increase in average wind speeds and a 23 percent increase in their destructive power. He added, "We have fundamentally altered the fabric of our atmosphere to cause more extremes."

As these changes have become more and more obvious, he said, opposition to climate science has shifted from hard denial to a softer denial, "which is perhaps even more dangerous."

He said the fossil fuel industries are engaging in this "soft denial." Now they say, "use the markets, we'll adapt," and they are encouraging minor individual efforts such as better light bulbs, not using straws, and not flying. It's all in the interests of deflection, putting the burden for reducing the rate of global warming on the individual instead of seeking systematic solutions such as a carbon tax. It's more "shaming" and "virtue-signaling," Mann said, "a divide-and-conquer strategy deployed by special interests."

> According to Dr. Jen Gunter, from the 1920s to today, women have been given the same message that they are filled with toxins, just different presentations of it.

"Doomism" is another real threat, Mann said. This promotes the idea that it is too late to do anything, so let's focus on other things. This is from the left side of the political spectrum, he noted, but these "doomsday scenarios are another form of denial."

The good news is that some conservatives are now coming to the table to talk. "We have to convey both urgency and agency," said Mann, adding, "There are things that we can do." Greatly expanding renewable energy is just a matter of political will. Young people get it, he said. For the rest of us, "It's up to us to act for our children and grandchildren." (For more, see Mann's Commentary on p. 18.)

Snopes.com founder David Mikkelson checks the facts.

Nonsense about Chemicals

Chemicals have a problem: many people hear only bad things about them. (I once heard a woman say, "I don't believe in chemicals"!) Chemist and noted science educator Joe Schwarcz of McGill University's Office of Science and Society in Montreal (its mission is to separate science from nonsense) does his best to counter the misconceptions. He has hosted a radio show on science for forty years. His mantra is "Chemicals are to be understood, not feared." He started his CSICon talk with a rundown of some bogus products, many involving the most basic and important chemical for us, water: "hydrogenated water" ("there are actually scientific papers on this"), Danish water revitalizer, a water alkalinizer (cost $3,000 to $4,000), and the alkaline diet ("fruits and vegetables are great, but they have nothing to do with alkalinity"). Then there is the "alpha spin," a $300 coaster that "cures everything" and "neutralizes EM radiation."

"It is one thing to talk about this silliness. Are we successful in combatting it?" Schwarcz asked.

To him, chemistry is the science that ties all the other sciences together. In alleviating some of the misconceptions about chemicals, he said, "We try to do some good."

Persuading the Public

Jonathan Jarry is a science communicator at McGill's Office of Science and Society where he works with Joe Schwarcz. He has a YouTube show *Cracked Science* that debunks pseudoscience, and he cohosts a medical podcast *The Body of Evidence*. He has found that in Canada they have some excellent journalists and that sometimes it really pays off to educate the public about pseudoscience rather than mock people for their gullibility. Video is a big tool. He has made a fake cancer-cure video that then debunked itself, garnering 15 million views.

He gave several other examples of successful skeptic education projects that have worked in Canada and offered the same advice that some other CSICon speakers have given: Don't be argumentative and closed-minded. Act less like know-it-alls. Go beyond the facts and talk about values. "If facts don't care about your feelings, feelings don't care about the facts."

Looking for Aliens

Seth Shostak, a radio astronomer with the SETI Institute in Mountainview, California, is actually looking for aliens but hasn't found any yet. "We have not found any compelling evidence of life beyond Earth," he reminded the CSICon audience, but the search is still young. With the Allen Telescope Array and other tools, the speed of SETI (Search for Extraterrestrial Intelligence) technology is accelerating in accord with Moore's Law: The speed of research is doubling every two years.

There are no shortage of candidate star systems. The latest estimate is that there are two trillion visible galaxies, he said, and the expectation is that each of them has approximately a trillion planets. If about 22 percent of Sunlike stars have habitable Earth-like planets and between 16 to 53 percent of red dwarf stars have habitable Earth-like planets, "the number of [Earth-like planets] in our galaxy is at least 50 billion," he said.

Yet despite all the protestations of UFO believers, no reliable evidence of any alien visitations to our planet has yet been found. He points out that we now have thousands and thousands of satellites in orbit and 770 of them are imaging Earth. The best of them have a resolution of a meter or two. If aliens were flying about in our atmosphere, then these sensors would see them, he said.

Malleable Memories

Elizabeth Loftus is renowned for her studies showing how memory is malleable and untrustworthy. She spoke to the CSICon audience on the "fiction of memory" and provided "fresh reasons—and some not so fresh—not to believe your own memories." Her experiments have shown that memory researchers can even implant false memories in people of things that never happened—and that these memories are just as vivid and real-seeming as real memories. She spoke of rich false memory, the consequences of false memories, and addressed whether it is even possible to tell the difference between real and false memories. It is not easy. For instance, one might wonder if true memories are more emotional than false ones. "No," she answered. "False memories can be just as emotional." Even worse, in functional magnetic resonance image (fMRI) studies, false and true memories give out the same brain signals.

False and fallible memories are bad enough, but today the situation has worsened with the prevalence of digitally doctored photos and fake news. Computer programs can now make anyone appear to be saying anything you want.

Loftus's take-home message was that one's confidence in a memory, its compelling detail, and the amount of emotion it evokes are not good guides to evaluating its veracity. Those three attributes "don't guarantee it is a true memory." As she concluded: "False and true memories can be equally real and equally brilliant."

Your Personal Skepticism

Troy Campbell, a social psychologist and marketing expert who also spoke at CSICon 2018 (his talk there became our cover article "Team Science: How to Be Better Science Activists," SI, July/August 2019), returned, this time to talk about our "personal skeptical existence." He wanted to explore "how we can use all these amazing talks and findings in our everyday life." "We can do amazing things with companies and with our own lives," he said, especially if we start with science and then have better human connections. "A skeptic face" doesn't help, he warned; "be inviting." Understand that humans are always going to exhibit confirmation bias, he said. "Confirmation bias will always be there." Realizing that it is a very human trait we all share to some degree will enable us to be more effective inquirers and also to help us find more meaning.

Snopes Checks the Facts

David Mikkelson founded Snopes.com, the noted fact-checking site, in 1994 (he's still CEO), and it has since risen to be a respected go-to source of checks on the validity of questionable claims appearing on the internet. He told the CSICon audience that Snopes.com now deals with 20 million unique monthly visitors. He manages everything on the site from researching and writing articles to overseeing its technical infrastructure. He likes to look at the form in which misinformation is spread, including some unscrupulous media outlets that constantly spew it. The United Kingdom's *Daily Mail* is one example, "a right-wing-leaning bastion of egregiously bad journalism." Snopes also recently examined a report from the Heartland Institute contending that global warming is a fabrication. He said his Snopes team found it to be "one big pile of scientific doo-doo." ■

CSICon 2020 will be held October 15–18 at the Westgate Hotel in Las Vegas.

Troy Campbell urges skeptics to be inviting and understand human foibles.

Elizabeth Loftus cautions that confidence in a memory doesn't mean it's real.

Kendrick Frazier is the editor of the Skeptical Inquirer.

How to Win the New Climate War

MICHAEL E. MANN

"There is general scientific agreement that … mankind is influencing the global climate … through carbon dioxide release from the burning of fossil fuels. … There are some potentially catastrophic events that must be considered. … Man has a time window of five to ten years before … hard decisions regarding … energy strategies might become critical. … Once the effects are measurable, they might not be reversible."

You might be forgiven for assuming those prophetic words were spoken by Al Gore. Instead, they were the words of fossil fuel giant ExxonMobil's own experts in recently unearthed internal documents from the 1970s (Banerjee et al. 2015). In subsequent decades, instead of heeding the warnings of its own scientists, ExxonMobil and other fossil fuel interests waged a public relations campaign contesting the scientific evidence and blocking policies aimed at curbing planet-warming carbon pollution.

Our planet has now warmed into the danger zone, and we are not yet taking the measures necessary to avert a crisis.

As a result, our planet has now warmed into the danger zone, and we are not yet taking the measures necessary to avert a crisis. We are in a war—and we must first understand the mind of the enemy, their evolving tactics, and how to combat them.

Our story takes us back decades to when the playbook of science denial was written. The tobacco industry sought to discredit the link between cigarettes and lung cancer even as its own internal research dating back to the 1950s demonstrated the deadly and addictive nature of its product (Oreskes and Conway 2010). Joined by billionaire plutocrats such as the Koch brothers, Mercers, and Scaifes, fossil fuel companies such as ExxonMobil have for decades funded a billions-of-dollars tobacco-industry-like campaign of science denial, working to discredit the science behind human-caused climate change and its link to fossil fuel burning.

Today, the impacts are no longer subtle. We see them playing out in the daily news cycle, on our television screens, in our newspaper headlines, and in our social media feeds. Coastal inundation, withering heat waves and droughts, devastating floods, unprecedented wildfires: *this* is the face of dangerous climate change. It's a face that Americans increasingly recognize.

So the forces of denial and delay—fossil fuel companies, right-wing plutocrats, "dark money" outfits, and fossil fueled petrostates—can no longer insist nothing is happening. They have instead shifted to a softer form of denialism, engaging in a multipronged offensive based on distraction, deception, and delay—what I call the "New Climate War."

They have masterfully executed a "deflection campaign" aimed at shifting responsibility from corporations to individuals. Personal actions, from going vegan to avoiding flying, are increasingly touted as the primary solution to the climate crisis. Though these actions are worth taking, a fixation on voluntary action alone takes the pressure off the push for governmental policies to hold corporate polluters accountable (Hagmann et al. 2019).

The deflection campaign provides an opportunity for the enemy to employ a "wedge" strategy, dividing the climate community by exploiting a preexisting rift between climate advocates focused on individual action versus policy action. Other preexisting rifts involve issues of gender, race, and matters of social justice.

Using online bots and trolls, manipulating social media and internet search engines, the enemy has deployed the sort of cyber-weaponry honed during the 2016 U.S. presidential election, preying on hatred, jealousy, fear, rage, bigotry—all the most base, reptilian brain impulses. They seek to sow discord, dissent, and division within the climate movement while generating outrage on the the part of their "base"—the disaffected right.

Meanwhile, they have effectively blocked policy action by: 1) opposing measures to regulate or price carbon emissions; 2) attacking viable alternatives (i.e., renewable energy); and 3)

promoting false solutions (e.g., coal with carbon capture or unproven and potentially dangerous "geoengineering" schemes). Hypothetical future "innovations," the argument goes, will somehow save us, so there's no need for any current policy intervention.

With climate progress sidelined by the dismantling of climate-friendly EPA policies, rolling back of regulations on pollutants, greenlighting of oil and gas pipelines, direct handouts to aid a struggling coal industry, and cheap leases to drill on public lands, the fossil fuel industry is enjoying free reign to expand their polluting enterprise.

They have meanwhile promoted the narrative that climate change impacts will be mild, innocuous, and easily adapted to undermine any sense of *urgency*, while at the same time promoting the inevitability of climate change to dampen any sense of *agency*. This latter effort has been aided and abetted by individuals who are ostensibly climate champions but have portrayed catastrophe as a *fait accompli*, either by overstating the damage to which we are already committed, dismissing the possibility of mobilizing the action necessary to avert disaster, or setting the standard so high (say, the very overthrow of market economics itself) that action is almost doomed to failure. The enemy has been more than happy to amplify such arguments.

But all is not lost if we learn to recognize the tactics that are being used—the forces of inaction—and how to combat them. Here is my four-point battle plan:

1. **Disregard the Doomsayers.** We must reject the overt doom and gloom that we increasingly encounter in today's climate discourse. The truth is motivation enough for action. We cannot be distracted by false prophecies of unavoidable doom. We must remain focused on forging ahead and solving the problem.

2. **A Child Shall Lead Them.** The youngest generation is fighting tooth and nail to save their planet, and there is great moral authority and clarity in their message. But the Eye of Sauron is focused upon them. The head of the Organization of the Petroleum Exporting Countries (OPEC) referred to the youth climate movement as the "greatest threat" the fossil fuel industry faces (Watts 2019). We must have their backs as they expose themselves to attack on the front lines of the new climate war. They are our future.

3. **Educate.** Most hardcore climate change deniers are unmoveable. They view climate change through the prism of right-wing ideology and are impervious to facts. Don't waste your time and effort trying to convince them. But there are many honest, confused individuals who are caught up in the crossfire, victims of the climate change disinformation campaign. We must disabuse them of the myths, introduce them to the facts, and provide them with lasting resources they can continue to rely upon.

4. **Systemic Change.** The fossil fuel disinformation machine wants to make it about the car you choose to drive, the food you eat, and the lifestyle you live rather than the larger system and incentives. But to solve this problem we need massive, systemic change, with our governments and corporations taking responsibility in solving the problem. We need policies to shift us toward clean energy and politicians who will do our bidding instead of the bidding of powerful polluters. So we must bring pressure to bear, using the power of our voice and our vote.

It is easy to become overwhelmed by the scale of the challenge ahead of us. Change is always hard, and we are being asked to make a journey into an unfamiliar future. It is unsurprising that anxiety and fear abound when it comes to the climate crisis and our efforts to deal with it. We must understand, though, that the forces of denial and delay are feeding on our anxiety and fear and using it against us to build a fortress of resistance. So we must be brave and find the strength to fight on, channeling that fear and anxiety into motivation and action. The stakes are simply too great.

As we continue to explore the cosmos, we have still not encountered any evidence of life elsewhere in our solar system, our galaxy, or indeed the entire universe. Life appears to be very rare indeed. Complex life even more so. And as for intelligent life … we may, at least for all intents and purposes, be alone. Just us drifting aboard this "Spaceship Earth." No other place to dock, no alternative ports at which to sojourn with air to breath, water to drink, and food to consume.

We've been given a goldilocks planet, with just the right atmospheric composition, just the right distance from its star (the Sun), yielding just the right temperature range for life, with liquid water oceans and oxygen-rich air. Every person we will ever know, every animal or plant we will ever encounter, is reliant on conditions remaining just this way.

To continue to knowingly alter those conditions simply so a few very large corporations can continue to make record profits constitutes a crime against our planet and all known life. We cannot be passive bystanders as pollutors work toward making that eventuality come to pass. We still have a chance to ensure this not be our legacy. ■

References

Banerjee, Neela, Lisa Song, and David Hasemyer. 2015. Exxon's own research confirmed fossil fuels' role in global warming decades ago. Top executives were warned of possible catastrophe from greenhouse effect, then led efforts to block solutions. *Inside Climate News* (September 16). Available online at https://insideclimatenews.org/news/15092015/Exxons-own-research-confirmed-fossil-fuels-role-in-global-warming.

Hagmann, David, Emily H. Ho, and George Loewenstein. 2019. Nudging out support for a carbon tax. *Nature Climate Change* 9: 484–489.

Oreskes, Naomi, and Erik M. Conway. 2010. *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming.* London: Bloomsbury Press, 6.

Watts, Jonathan. 2019. 'Biggest compliment yet': Greta Thunberg welcomes oil chief's 'greatest threat' label. *The Guardian* (July 5). Available online at https://www.theguardian.com/environment/2019/jul/05/biggest-compliment-yet-greta-thunberg-welcomes-oil-chiefs-greatest-threat-label.

Michael E. Mann is distinguished professor and director, Earth System Science Center, Department of Meteorology, Pennsylvania State University, University Park, Pennsylvania.

Believing in Science Is Not *Understanding* the Science: Brazilian Surveys

NATALIA PASTERNAK AND CARLOS ORSI

More Brazilians believe in the importance of vaccines than in the validity of so-called alternative therapies, and almost 90 percent of the adult population accepts—at least in part—the fact that climate change is real and caused by human activity. Nevertheless, almost half of Brazilian adults reject one of the fundamental principles of the theory of evolution: humans and other primates descend from a common ancestor. Moreover, almost 40 percent of the country's adult population believes the government hides information about beings from other planets.

These are some of the results of a national survey on public understanding of science conducted by the Datafolha Institute, a respected polling organization, on behalf of Instituto Questão de Ciência (IQC, Question of Science Institute), where we are both founders and directors. More than 2,000 Brazilians aged sixteen and over were surveyed in March 2019 in 130 municipalities in all parts of the country. The margin of error of the results is plus or minus two percentage points.

The survey evaluated the degree of agreement of respondents with a series of statements that either reflect scientific consensus (e.g., "Getting vaccinated is important because it brings health benefits"; "The Earth revolves around the Sun"; "Global warming and climate change from human activities are a real problem that will have serious effects on society") or pseudoscientific beliefs ("Spiritual energy can have the power of healing"; "Aliens have visited ancient civilizations on Earth"; "Genetically modified foods are harmful to health").

A few months later, a comprehensive national survey on public perception of science was released by the Brazilian Society for the Advancement of Science (SBPC) in partnership with the Center for Management and Strategic Studies (CGEE), an office of the federal government.

The survey evaluated the degree of agreement of respondents with a series of statements that either reflect scientific consensus or pseudoscientific beliefs.

The SBPC-CGEE survey shows that Brazilians are very optimistic and fond of science; 73 percent of the respondents believe that science brings "more good than harm" to society, the same number as the previous survey in 2015, and 86 percent think that science is important for industrial development. Sixty-six percent support science public funding, and 84 percent of Brazilians regard scientists as a reliable source of information. When this particular question is reversed, the result seems even more impressive: only 1 percent of the respondents consider scientists not trustworthy.

These figures have been explored by SBPC as a political tool to demand that science funding be restored. Brazilian science is now facing a major funding crisis. Our national science budget has been cut in half, funding agencies are unable to honor grants and scholarships and thus collapsing, and the country is suffering from a major brain drain.

However, no matter how noble the overall goal might be, when the survey probes deeper, all this national enthusiasm for science vanishes into thin air. On one hand scientists are seen as trustworthy, but, on the other, the number of respondents who define scientists as "clever people who do good deeds for humanity" has dropped from 52 percent in 2015 to 41 percent in 2019.

On top of that, 90 percent could not name a single Brazilian scientist, and 88 percent were unable to name a single research institution, even though in Brazil all federal and state level universities are also research centers. Among those who named a Brazilian scientist, most mentioned Marcos Pontes—our minister of science and technology, who is *not* a scientist but a former engineer trained as an astronaut. Pontes never pursued a career in science. Having returned from his one and only space trip, he moved

on to work as a motivational coach and poster boy for assorted space-related products. As for science understanding, 74 percent are afraid of GMOs, and 78 percent believe antibiotics can kill viruses.

IQC's survey assessed mainly science understanding and not perception or appreciation, and the result shows a multifaceted national profile in which 97 percent agree on the importance of vaccines, but 83 percent think alternative medicine is a "good option for treating diseases." Sixty-six percent believe in the healing power of "the spiritual." Moreover, the statement "Human beings and chimpanzees come from a species of common origin" is accepted by just over half of the sample (54 percent), while 73 percent think that consuming GMO food is bad for your health.

More people believe in conspiracy theories involving governments and aliens (38 percent) than in the safety of GMOs for human health (27 percent), despite the fact that the first statement is pseudoscientific and the second is a solid scientific consensus. A 2016 survey of the National Academy of Sciences of the United States found more than 1,500 studies confirming that the consumption of GMOs has no negative impact on human health.

On the plus side, so-called antiscientific denial—rejection of statements endorsed by the scientific community—seems to have very little penetration, except for evolutionary theory and the transgenics issue. Only 3 percent of people rebutted the importance of vaccines; 8 percent denied that Earth revolves around the Sun; and 10 percent rejected the reality and seriousness of climate change.

But it is a "half-full, half empty" kind of situation. The IQC-Datafolha survey found four different population profiles regarding scientific knowledge and beliefs among Brazilians. The "science-friendly" profile comprises 29 percent of Brazilians only, encompassing those who strongly agree with a majority of the scientific consensuses on so-called "controversial" topics (GMO safety, climate change, evolution, ancient aliens). Even within this already small group, 40 percent of the respondents believe that spiritual forces have healing powers.

Every two years, the U.S. National Science Foundation discloses its Science and Engineering Indicators, a thorough survey that includes questions about popular understanding of science. In its most recent edition, compiled in 2016, the statement "Human beings, in their current form, developed from other species of animal" was considered "true" by 52 percent of respondents.

A majority of the respondents, 73 percent, believe that science brings "more good than harm" to society.

Likewise, a recent article in the *Proceedings of the National Academy of Sciences* (*PNAS*) points out that in addition to ignorance about scientific facts, the problem of public understanding of science also involves the lack of knowledge about the methods and processes of scientific activity.

It seems likely that a person who accepts the idea of common ancestry, for example—solely based on the words of some authority, having no idea what that actually means or where that conclusion comes from—leaves the door open for this belief to be replaced by another coming from a more charismatic authority.

In Brazil's case, this seems like a good description, even for people who have higher educational levels, because 82 percent of respondents with university diplomas believe in the efficacy of alternative medicine, and 73 percent believe that GMOs are harmful. It suggests that "epistemic ignorance"—the ignorance of processes that generate and justify scientific knowledge—remains a blind spot in science education and communication efforts.

"Citizens can be misinformed and uninformed at the same time," says the *PNAS* article, drawing the distinction between *uninformed* (i.e., ignorant of facts) and *misinformed* (i.e., believing in ideas and concepts that do not correspond to facts). "For example, citizens may be uninformed about how the processes of science work and are misinformed of the facts of some specific scientific issue."

Altogether it suggests that providing information is just as important as making explicit the process of generating information. In other words, in addition to communicating data and results, "communicating science" should be, indeed, about communicating a way of thinking. ■

Further Reading

NSF Science & Engineering Indicators, Available online at https://www.nsf.gov/statistics/2018/nsb20181/report/sections/science-and-technology-public-attitudes-and-understanding/public-knowledge-about-s-t.

Percepção Pública da C&T no Brasil, Available online at https://www.cgee.org.br/web/percepcao.

Science audiences, misinformation, and fake news, Available online at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6475373/pdf/pnas.201805871.pdf.

Survey: Beliefs in science and pseudoscience in Brazil, Available online at http://revistaquestaodeciencia.com.br/english/2019/05/23/survey-beliefs-sci-

Natalia Pasternak is a microbiologist with a PhD in bacterial genetics and a research fellow at the University of São Paulo. She's founder and current president of Instituto Questão de Ciência (Question of Science Institute). Carlos Orsi is a journalist and science writer who also writes mystery and science fiction. He's currently chief editor of *Revista Questão de Ciência* (*Question of Science Magazine*).

Joe Nickell, PhD, is CSI's senior research fellow. A former Pinkerton detective and police homicide consultant, he is author of many investigative books, including *Crime Science* and *Unsolved History*.

Lizzie Borden's Eighty-One Whacks: Table-Tipping Testimony from a Spirit?

Lizzie Borden took an axe
And gave her mother forty whacks;
When she saw what she had done,
She gave her father forty-one!
—*Anonymous*

On August 4, 1892, in the Massachusetts seaport and cotton-mill town of Fall River, a unique double axe murder occurred that shocked the citizenry at the time and continues to fascinate. Although the only person charged in the case was acquitted (and so, technically, the crime went unsolved), there was widespread refusal to accept the not-guilty verdict. That view was expressed in numerous ballads, songs, and rhymes—the best known of which is the anonymous quatrain quoted above (*Benét's* 1987, 114).

Like many other sensational cases, it has attracted occultists, including ghost hunters who claim that the spirit of a murder victim possessed and spoke through one of their psychics and communicated—by means of a phenomenon called table tipping—the killer's identity. Can we believe the claims?

Two Crime Scenes

At approximately 11:15 in the morning, Lizzie Andrew Borden, the thirty-two-year-old unmarried daughter of Andrew Jackson Borden, age seventy, shouted upstairs to the live-in maid, Bridget Sullivan, urging her to "Come down quick! Father is dead. Somebody came in and killed him!" When Bridget rushed down from the attic room (she had been resting from cleaning windows that hot day), Lizzie sent her for the doctor.

Figure 1. The author poses in the approximate position (the photo was made impromptu) that Andrew Borden's body was found on the sitting-room sofa. (Author's photo.)

Andrew Borden was lying dead on the sitting-room sofa (see Figure 1), his face and head so mutilated he was virtually unrecognizable. As neighbors and the family doctor began to arrive, eventually someone thought to inquire about Mrs. Borden. The former Abby Gray Durfee was Andrew's second wife and stepmother to Lizzie and her older sister Emma—the latter having been out of town visiting friends at the time of the slayings. Abby Borden was discovered savagely murdered in the upstairs guest room. Notwithstanding the popular ditty about the Bordens receiving a total of eighty-one "whacks," it was actually an estimated eighteen to twenty-one blows for Andrew Borden and nine to eleven for Abby, all in the area of the head and neck (Holba 2008, 6). Mr. Borden had not been robbed (his ring, watch, and pocketbook were undisturbed); neither had there been a robbery of the house (Pearson 1987, 210).

Abby's presence in the guest room was easily explained. She had gone there to make the bed of the briefly visiting brother of the first Mrs. Borden, John Morse, the Borden sisters' uncle. Morse was naturally among the initial suspects, but having gone out for the morning, he had an airtight alibi and no apparent motive; therefore, police began to look elsewhere.

Because the blood from Abby's wounds had ceased to flow and had coagulated on the floor, and due to her lower body temperature (Pearson 1987, 213), it was determined that Abby had been killed one to two hours prior to her husband's death. Therefore, the murderer—if it were neither Lizzie nor Bridget—would have had to remain carefully concealed in the house for that amount of time, waiting for Andrew to return from business downtown and risking Abby's body being discovered in the meantime. It was difficult for the police to suspect an upper-middle-class lady such as Lizzie of such barbarity toward her parent. Therefore, they focused instead on Bridget. However, she lacked motive, and her movements, verified by Lizzie and others, placed her away from the two crime scenes at the times of their occurrence (Kurland 1994, 42–46; Jones 1987, 191–194; Fido 1993, 90–91).

Phantom Suspects

Sightings of possible suspects and rumors of sightings were run down. A "wild-eyed man" proved to be a local known as "Mike the soldier," a sometimes weaver and saloon-frequenter

whose activities were accounted for. A man seen by a Borden neighbor on the back fence had been, the man embarrassingly admitted, attracted by the pear tree. And so on. Police investigated the reports, some of them no doubt inspired by the $5,000 reward offered the day after the slayings by the Borden sisters, Emma and Lizzie (Pearson 1987, 220–22).

Journalist Edwin Porter of *The Fall River Globe* followed the case daily. A year after the murders, he turned his newspaper stories into a book, *The Fall River Tragedy*. He considered how unlikely the possibility of an outside perpetrator would have been, remarking "how fortune had favored the assassin."

He continued: "It was a wonderful chain of circumstances which conspired to clear the way for the murderer; so wonderful that its links baffled men's understanding" (qtd. in Kurland 1994, 45; see also Pearson 1987, 212–213). Unless, of course, it was an inside job!

Lizzie's Actions

Whereas the movements of Bridget, the maid, were corroborated, Lizzie's were not. She had no witnesses to support her story. When asked where she was when her father was murdered, Lizzie stated she had gone to the barn loft to get some sinkers for fishing, spending twenty minutes there while eating some pears. However, the loft floor was covered with undisturbed dust, there were no fruit cores, and Lizzie had not fished for years. It was noted that Mr. and Mrs. Borden had been very ill on the night before and, when poison was considered a possibility, officers inquired at local pharmacies. A clerk at one said a lady had attempted to buy prussic acid (a solution of hydrogen cyanide) on the previous day, and he subsequently identified her as Lizzie Borden. She said she wanted it to kill moths in a seal-skin coat (Jones 1987, 202–214; Fído 1993, 91).

Lizzie had appeared to try to slyly manipulate those in the house in a way that would facilitate murder. When her father came home and might have been expected to inquire of his wife's whereabouts—and perhaps even discover her murdered body—Lizzie told him, she said, "Mrs. Borden has gone out; she had a note from somebody who was sick." In fact, no such note was ever found, nor was anyone ever identified as to having summoned Mrs. Borden, due to illness or otherwise (Pearson 1987, 200, 215, 231).

Again, as if she needed to be rid of a potential witness, Lizzie suggested that Bridget might want to go out for the afternoon, even offering helpfully, "There is a cheap sale of dress goods at Sargent's at eight cents a yard." Instead, the servant went to lie down in her attic room, which did effectively remove her from the murder site until, of course, she was summoned by Lizzie with the news that Mr. Borden was dead.

The Borden case has attracted occultists who claim that the spirit of a murder victim possessed and spoke through one of their psychics and communicated the killer's identity.

Lizzie's behavior came under review, many noting her lack of emotion regarding the double tragedy. Her father's brother-in-law—observing that Andrew Borden's "estate furnishes the only motive"—had a long talk with Lizzie the night after the murders and observed: "She was very composed, showed no signs of any emotion, nor were there any traces of grief upon her countenance. That did not surprise me, as she is not naturally emotional." Describing Lizzie as having been the most vocal of the two sisters during ten years of disputes over money with their father and stepmother, he said Lizzie

> was haughty and domineering with the stubborn will of her father. … Lizzie is of a repellent disposition, and after an unsuccessful passage with her father, would become sulky and refuse to speak to him for days at a time. … Her father's constant refusal to allow her to entertain lavishly angered her. I have heard many bitter things she has said of her father. (Harrington 1892)

Inquest and Trial

During the inquest, at which Lizzie Borden testified, she gave conflicting accounts of her actions at critical times. Her defenders point out that during this period she was sedated by morphine prescribed by the family physician. On one occasion, being pressed, Lizzie became so confused that she said: "I don't know what I have said. I have answered so many questions and I am so confused I don't know one thing from another. I am telling you just as nearly as I know how" (Holba 2008, 133).

Some of Lizzie's former classmates had found her "rather eccentric." Be that as it may, she did show animosity toward both her stepmother, whom she insisted on calling "Mrs. Borden," and her father. This accounted for her motive, as did a large inheritance. Her presence at the house during both murders (despite her unsubstantiated claim to have been in the incredibly hot barn loft during her father's murder) answered for means and opportunity.

That there was no blood on her dress was countered by the fact that a blue dress worn that morning had given way to a print one later—by her own admission (Borden 1892). Incredibly, Lizzie's friend Alice Russell testified she had seen Lizzie burning a dress three days after the murders and heard her tell Emma, who had questioned her action, "I am going to burn this old thing up, it is covered with paint" (Kurland 1994, 47–48). The judge who conducted the hearing concluded Lizzie was "probably guilty," and she was remanded to Superior Court (Pearson 1987, 231).

During the thirteen-day trial, the defense managed to have Lizzie's inquest testimony excluded along with the testimony of the drug store clerk identifying Lizzie as having sought to buy prussic acid. With the most damaging evidence

excluded, Lizzie choosing not to testify this time, and there being public sentiment for what the *New York Times* called "this unfortunate and cruelly persecuted woman," the jury took just over an hour to acquit her on June 20, 1893 (Pearson 1987, 253, 263; Kurland 1994, 48–49).

Aftermath

Interestingly, following the trial Lizzie's defense attorney, Andrew Jennings, severed all contact with her (Brown 1991, 96). The Borden sisters soon moved into another house. Lizzie—now calling herself Lizbeth—was charged with larceny in 1897 over two paintings allegedly shoplifted from a store and traced to Lizzie's home, but apparently the warrant went unserved. In addition, despite her new-found wealth, she also stole some porcelain plates from a store in Providence. Even before the murders, she was a well-known shoplifter: "Stores such as McWhirr's Dry Goods, Gifford's Jewelry Store, and Cherry & Webb's knew to watch her and send the bills to her father" (McNamara 1992, 40–41).

The Borden case has attracted occultists who claim that the spirit of a murder victim possessed and spoke through one of their psychics and communicated the killer's identity.

Emma soon separated from her sister, and the two ceased to speak. (I have wondered if the willful Lizzie may have boldly admitted her guilt to her *after* receiving the protection of a verdict of not guilty.) In 1923, the two were involved in litigation over a building of their father's that they owned jointly; Lizzie wished to sell her portion. Lizzie died June 1, 1927, and her sister followed nine days later (Pearson 1987, 268–270; Kurland 1994, 49).

Various issues and innuendoes have surfaced over the years. After Lizzie's death, *The Evening Standard* of June 3, 1927, cited reports "that she was a woman of decided opinion and will, more masculine in appearance and ways than feminine." *The Alyson Almanac: A Treasury of Information for the Gay and Lesbian Community* listed Lizzie as a "suspected homosexual" (qtd. in Holba 2008, 147).

Of course, Lizzie's presumed lesbianism does not in any way imply her guilt and is irrelevant, except perhaps as part of an attempt to understand her whole personality in its social context. Writer David Salvaggio, writing in the *Lizzie Borden Quarterly*, makes such an attempt:

> Lizzie Borden was a miserable and lonely lesbian, tangled in the Victorian web of the late nineteenth century; caught in a man's world long before women's suffrage. A kleptomaniac obsessed with materialism, she could no longer bear the frugal father who thwarted the lavish life she desired. And what would her future be if the bulk of the estate went to [her stepmother] Abby? (Salvaggio 1994, 6)

Some still refer to the brutal slayings as an unsolved mystery. However, writing a century later, my friend Gary Earl Ross, winner of the 2006 Edgar Allan Poe Award from Mystery Writers of America, observed how the lack of advanced forensics, together with the inquest testimony having been ruled inadmissible, hindered the quest for justice. As he notes, today things would be different:

> There would be no need for Officer George Allen to deputize passerby Charles Sawyer to stand guard at the rear door. The first officers on the scene would secure the site and safeguard the integrity of the physical evidence. The house would be cordoned off while evidence was collected, bagged, sealed and labeled. Modern forensic analysis of the physical evidence would leave few if any of the evidentiary ambiguities associated with the case. Fingerprinting, blood typing, electron microscopy and DNA testing would all play significant roles in determining the guilt or innocence of Lizzie Borden. (Ross 1992)

Nevertheless, based on the available evidence, I am persuaded that the case was indeed solved. The Fall River police came to realize that Lizzie Borden was the only person who *could* have committed the brutal murders and, given her obvious motive and incriminating additional evidence, shrewdly planned and brutally carried out the murders of her father and stepmother.

Haunted House?

The original Borden House address of 982 Second Street has been changed to 230, but the house looks much the same as it did at the time of the murders. Long a city landmark, in 1996 it was converted into a combined museum and bed and breakfast, offering eight bedrooms. The interior has been restored with period-style furnishings. I had an enjoyable guided tour there on July 5, 2014 (following my lecture the previous day at an annual Mensa conference in Boston).

The tour guide seemed anxious for any opportunity to reinforce the notion of ghostly activity. As I had learned the night before, my camera battery charge was depleted and—having traveled very light and only planning the Fall River portion of my trip at the last minute—I had not packed a recharger. When I mentioned that my camera would not take a photo (and before a fellow tourist generously offered to take one for me), the tour guide announced that drained batteries were common there—reciting a claim often made by so-called ghost hunters who consider that a paranormal occurrence. But of course, the Borden house had nothing whatsoever to do with my depleted charge. Such claims sound suspiciously like confirmation bias: whenever one notes a drained battery, a ghost hunter may count it as evidence of paranormality, while ignoring all the times there is no battery drainage. For example, *none* of the other members of my tour group had any problems with *their* cameras as they snapped photos throughout the tour—evidence that puts the lie to the drained-batteries anecdotal claim.

On my tour, I saw no ghosts, only some very dubious old photographs that supposedly showed them. "Orbs"

and "faces" in photos, as well as anecdotal evidence (including accounts of "feelings" and reported glimpses of specters), and so on, do not count as scientific evidence. Claims of ghosts—including their alleged detection by "ghost hunters"—invariably have science-based explanations. For example, as I have shown experimentally, "orbs" will occur when the camera's flash rebounds from particles of dust in the air, while "faces" may be perceived in random patterns or may simply be faked. Ghost-hunting equipment (such as electromagnetic-field [EMF] meters and thermal-imaging cameras) does not detect ghosts but instead quite often detects the ghost hunters themselves (Nickell 2012, 65, 103, 259–268, 309–310)!

Table Tipping and More

In their book *The Ghost Chronicles* (2009), "medium" Maureen Wood and "paranormal scientist" Ron Kolek relate a lot of ghostly goings-on at the Borden house. As they began their so-called investigation, Wood had only stepped into the hallway when she "felt an overwhelming sense of evil." Accompanying the duo was Gavin Cromwell, a Welsh "psychic," who seems like a bad actor feigning clairvoyance. According to Wood, "He began to stumble around the kitchen, moving back and forth with his fingers to his forehead." He said, "I'm getting the name Abby," to which Wood showed a moment of skepticism, remarking, "Without being certain of how much prior knowledge of the gruesome murders Gavin had, I held my tongue" (Wood and Kolek 2009, 233, 234).

Indeed, everyone in the ghost-hunting group—including a pair from the United Kindom—seemed well acquainted with the Borden case. Cromwell sensed, "It feels like a male energy doing this killing," then picked up a photo of Lizzie Borden and announced, "I think she was a lesbian" (Wood and Kolek 2009, 239). Cromwell said he is "getting" a name like "Sulliban" and, as others corrected that to "Sullivan," he announced, "She's a servant." Wood seemed to channel a spirit who uttered moans and then spat, "Dirty girl." The entity identified herself as "Abigail" and warned helpfully, "Never turn your back—in this house." Then Wood's body stiffened as the spirit supposedly took control (Wood and Kolek 2009, 245–248), although the others reacted quickly to drive the (imagined) entity out.

After Wood left for home to get some sleep before work, Cromwell asked for a small table to use in an attempt to communicate further with Abby. A nineteenth-century Spiritualist practice, the table-tipping phenomenon involved sitters placing their hands atop a suitable table (usually a pedestal one) and inviting spirits to tilt it, say, once for *yes*, twice for *no*. The famous physicist Michael Faraday conducted experiments that demonstrated the mediums actually caused the movement by putting pressure on the tabletop, often unconsciously. This unconscious action is known as the ideomotor effect, which is also responsible for the movement of Ouija-board planchettes and of dowsing rods and pendulums (Nickell 2012, 197, 348–349).

I have gone undercover to sit in on a medium's table-tipping act. This occurred in a "haunted" mansion in upstate New York where, for a time in 2000, a private spiritualist circle held séances. I infiltrated the group with one attendee's help, and I sat at one table-tipping session. I received loving messages from an apparent aunt and uncle, but because I had made them up on the spur of the moment, I knew the medium was—deliberately or unconsciously—simply providing "messages" from her imagination (Nickell 2012, 217).

At the Borden house, the little table was in the center of the front parlor. Cromwell called up the spirits and soon announced, "Abby's here." After some preliminaries, one of the sitters asked, "Abby, if Lizzie killed you, could you please make the table move again?" Immediately, the table rocked, appearing to confirm, writes Ron Kolek, "that Lizzie had murdered her" (Wood and Kolek 2009, 254). Next the group tried something called glass swirling. Invented by British occultists, it involves placing a glass mouth down on a table and each sitter then placing a finger on its bottom. As in table tipping, the glass responds according to directions. Asked to move the glass to the center of the table or to make a circular movement, "Abby" supposedly animated the glass accordingly. Asked if she got along with Lizzie, the supposed spirit of Abby Borden—or the sitters' unconscious movement—slowly moved the glass off the table (Wood and Kolek 2009, 254–257).

The group had brought alleged ghost detection gadgets to the site, but these proved less than useful. Once, an EMF meter did sound, but the response proved only to be from electrical wires (a source of electromagnetic fields) that ran along the basement rafters (Wood and Kolek 2009, 251). The ghost seekers relied mostly on "spiritual methods" such as table tipping and trance channeling. These purportedly revealed "the pain of Abby's death and a glimpse of her killer" (Wood and Kolek 2009, 259). In fact, the ghost hunt proved merely a silly exercise, adding nothing to the Borden case but superstition, pseudoscience, and playacting. In my view, Abby Borden remained as emphatically dead as the day her stepdaughter Lizzie hacked her to death. ■

References

Benét's Reader's Encyclopedia. 1987. Third ed., New York: Harper & Row.

Borden, Lizzie. 1892. Inquest testimony reproduced in Pearson, 1987, 226–230.

Brown, Arnold. 1991. *Lizzie Borden: The Legend, The Truth, The Final Chapter*. Nashville, TN: Rutledge Hill Press.

Fido, Martin. 1993. *The Chronicle of Crime: The Infamous Felons of Modern History and Their Heinous Crimes*. New York: Carroll & Graf.

Harrington, Hiram. 1892. Interview, "Close in Money Matters," The Fall River *Daily Herald* (August 5); qtd. in Brown 1991, 118–119.

Holba, Annette M. 2008. *Lizzie Borden Took an Axe, or Did She?* Youngstown, NY: Teneo Press.

Jones, Richard Glyn. 1987. *Unsolved! Classic True Murder Cases*. New York: Peter Bedrick Books.

Kurland, Michael. 1994. *A Gallery of Rogues: Portraits in True Crime*. New York: Prentice Hall.

McNamara, Eileen. 1992. Was Lizzie Borden the victim of incest? In Ryckebusch 1993, 39–45.

Nickell, Joe. 2012. *The Science of Ghosts: Searching for Spirits of the Dead*. Amherst, NY: Prometheus Books.

Pearson, Edmund. 1987. The Borden case, in Jones 1987, 185–271.

Ross, Gary Earl. 1992. If Lizzie Borden had been born 100 years later. In Ryckebusch 1993, 241–249.

Ryckebusch, Jules R. 1993. *Proceedings Lizzie Borden Conference, Bristol Community College, Fall River, Mass., August 3–5, 1992*. Portland, ME: King Philip Publ. Co.

Salvaggio, David. 1994. Whodunit?: A Borden buff's theory on the crime. *Lizzie Borden Quarterly* 2(2); qtd. in Holba 2008, 147.

Wood, Maureen, and Ron Kolek. 2009. *The Ghost Chronicles: A Medium and a Paranormal Scientist Investigate 17 True Hauntings*. Naperville, IL: Sourcebook.

[NOTES ON A STRANGE WORLD

MASSIMO POLIDORO

Massimo Polidoro is an investigator of the paranormal, lecturer, and cofounder and head of CICAP, the Italian skeptics group. His website is at www.massimopolidoro.com.

King Arthur Found?

Was the castle of King Arthur found? That's what newspaper headlines stated some time ago in reference to excavations conducted on the archaeological site of Tintagel, north of Cornwall in England. The town has always been a destination for fans of the legendary figure of the sovereign, but the remains of the existing castle date back to the thirteenth century, while the saga of King Arthur is generally placed some centuries earlier.

The discovery of one-meter-thick walls, steps, and slate floors dating back to the sixth century suggests that a palace of ancient rulers once existed there. According to medieval tradition, Arthur was born in Tintagel from the illicit relationship between a British king and the wife of a local duke. A coincidence?

Scholars have long been trying to understand whether King Arthur is just a legend or there really was a historical figure who may have inspired him. Here are their conclusions.

An Immortal Legend

The first text to collect legends and stories that had circulated for centuries, not only in Britain but also in Europe, was the *Historia Regum Britanniae* of 1136, the work of Welsh monk Goffredo di Monmouth. It was he who put in writing the story of Arthur, the illegitimate son of King Uther of Pendragon, raised by the magician Merlin, who acquired a sword stuck in a rock and with it the right to become king of Britain.

Scholars have long been trying to understand whether King Arthur is just a legend or there really was a historical figure who may have inspired him.

Later authors enriched the story, telling how Arthur received the magical Excalibur sword from the Lady of the Lake, defeated the invaders, and gathered at his palace—the castle of Camelot—the valiant Knights of the Round Table, an order devoted to justice and honor. But peace did not last long.

Thanks to French poet Chrétien de Troyes, in the twelfth century, Lancelot, Arthur's most trusted warrior, appeared

in the saga. He fell in love with Guinevere, the sovereign's wife, and their illicit love contributed to the fall of Camelot. Lancelot then left in search of the mysterious Grail; he saw it but was not able to seize it. The enterprise succeeded instead to his son Sir Galahad, another knight conceived by Lancelot with the daughter of the Fisher King.

Thomas Malory, who wrote in the fifteenth century, then developed the story of Mordred, a son that Arthur had in his youth from his half-sister and sorceress Morgana. Mordred plots behind Arthur's back, pushing Guinevere to adultery, thus trying to distract the king so that he can usurp the throne. But in the Battle of Camlann, he was killed and Arthur, although a winner, was seriously injured. The king was taken to the island of Avalon to heal his wounds, and along the way he returned Excalibur to the Lady of the Lake. Legend has it that Arthur did not die but remained on the island to recover his strength waiting for the day when the country would need him again.

Did an Arthur Exist?

This wonderful and immortal story has inspired countless versions—and it could have a historical basis.

However, this is not a historical reality like that of Alexander the Great or Charlemagne, who became heroes of medieval legends but whose existence has been reliably documented.

"In the case of Arthur the emphasis is all on the legend," explains Geoffrey Ashe (1995), considered the greatest Arthurian expert.

> To say that Arthur existed would mean recognizing that a magnificent monarch lived and ruled, for a certain period of time, in his glorious medieval court, as narrated in the romances. And this is not true. There has never been such a person, a King Arthur so understood. On the other hand, to say that Arthur did not exist would mean that he is only a fictional character, invented in the Middle Ages when these stories spread, and that there are no previous historical references or a real person behind these stories. This is also not a correct answer. (Ashe 1995)

In fact, it was discovered that between the end of the fifth and the beginning of the sixth centuries, shortly after the period in which Arthur is supposed to have lived, no less than six British princes were baptized "Arthur." None of them was important enough to originate the legend, but it could be assumed that the popularity of the name derives from the existence of an Arthur, a real and eminent figure of the recent past, just as many girls born at the end of the twentieth century were named Diana in memory of the princess who had just died.

It could be assumed that the popularity of the name derives from the existence of an Arthur, a real and eminent figure of the recent past.

'His Supreme Majesty'

A clue as to who this eminent figure could have been can be found in the account of Godfrey of Monmouth. In it, he says that Arthur engaged in a campaign on the continent as an emperor named Leo led the Eastern Roman Empire.

Between 457 and 474 CE, the emperor of the East was actually Leo I the Trace, and in that period, between 468 and 470, there was a man, described as a British king, who led an army on the continent. There is a letter addressed to him by the Roman bishop Sidonio, who begs him to look after some slaves whom he controlled and had fled to northern France.

If the letter had been made out to "Arthur," the mystery would have already been solved, but it is instead directed to a "Riothamus." It was long believed that this was the name of the king in question, but Ashe and other historians have discovered that "Riothamus" was not a personal name but a title that—in the Celtic language of Britain—meant "his supreme majesty" or "supreme real."

Things start to get even more interesting when, reconstructing the exploits of the Riothamus army, Ashe finds a series of very suggestive coincidences.

The king presumably arrived in Brittany and marched to Berry, where he was defeated by the Goths. However, he joined forces with the Roman allies, and a new battle took place in 470 in Bourges, where the British were still rejected. The cause of the defeat was the betrayal of the prefect of the Praetorium of the Gauls, a man named Arvando, who had encouraged the Goths to attack the British and then share the country with the Burgundians. Withdrawing, the men of Riothamus should have entered Burgundy, but no news of them was heard. Riothamus disappeared into thin air, just as he headed toward a true Burgundian city called … Avallon.

An Unbeatable Source of Stories

It's almost too good to be true; there is the story of Arvando's betrayal, reminiscent of Mordred's, and the disappearance of Riothamus directed at Avallon, just like Arthur who disappeared on the island of Avalon.

For Ashe, Riothamus is the figure on which the legend of King Arthur was erected: "There are too many coincidences and Riothamus does so many [Arthurian] things that I think we finally managed to hit the target," he says.

Who knows if this is really the case; surely King Arthur remains the greatest mystery of English history and continues to raise questions about his historicity. From *The Lord of the Rings* to *Star Wars*, from Harry Potter to *Game of Thrones*, from the *Dark Tower* to the *Hunger Games*, there is no fantasy epic that does not owe a debt to the Arthurian saga. As a source of stories, no one can beat King Arthur. ■

Reference

Ashe, G. 1995. The origins of the Arthurian Legend. *Arthuriana* 5(3) (Fall).

[REALITY IS THE BEST MEDICINE HARRIET HALL

Harriet Hall, MD, also known as "The SkepDoc," is a retired family physician, a CSI fellow, and an editor of the *Science-Based Medicine* blog. Her website is www.skepdoc.info.

In Praise of Uncertainty

There is an old joke about a patient who had high praise for her new doctor. She had headaches for years, and no one was ever able to explain why. The cause remained uncertain. But the uncertainty ended when her wonderful new doctor promptly diagnosed her with cephalalgia. The joke is that cephalalgia is not a diagnosis; it's just the medical synonym for headache. She already knew she had headaches—but putting a medical label on it validated it for her.

We humans crave certainty, and that craving is a handicap imposed on us by the evolution of our brains. But uncertainty is far more realistic, and we would do well to train ourselves to live with uncertainty and tolerate ambiguity. This is especially true in medicine, where it's better to have *no* answer than to have the *wrong* answer. The wrong answer could kill you.

Certainty is overrated. Research on the Dunning-Kruger effect shows that the less people understand something, the more certain they are.[1] Robert A. Burton, a neurologist, wrote the excellent book *On Being Certain: Believing You Are Right Even When You're Not*. He showed that your level of certainty that you are right has nothing to do with how right you are.

When I was practicing medicine, I sometimes had to resort to the diagnosis of IBTHOOM, which stands for It Beats The Hell Out Of Me! It described patients whose symptoms remained unexplained after an appropriately extensive workup. They wanted an answer and thought if we just did more tests, the answer would become evident. I had to explain to them that we had done all the indicated tests and that further indiscriminate testing would only muddy the waters. How would we even know what tests to choose? Should we x-ray their toes? Do blood tests for polio or chickenpox? Do an exploratory operation to cut their belly open and look around inside? Do a brain biopsy? None of the tests I could think of were indicated or likely to find a legitimate answer. When the probability of a disease is very low, false positive results are far more likely than true positives. If we did enough tests, we would surely find abnormal results on one or more of them—results that were meaningless and would only lead to further fruitless diagnostic efforts, including possibly dangerous invasive procedures. I pointed out the good news: we had already done all the appropriate tests, and while we didn't know what they had, we knew what they *didn't* have. No life-threatening problems had been identified; we had confirmed that they were not in any danger.

We humans crave certainty, and that craving is a handicap imposed on us by the evolution of our brains.

At this point, one of three things could happen: the symptoms could improve, get worse, or stay the same. If they improved or went away, it really wouldn't matter what had caused them. If they got worse, or if new symptoms developed, we could always reevaluate and do more tests. Serious medical conditions are likely to progress and reveal themselves over time, so progression or new symptoms might give us some valuable clues about what to test. If the symptoms stayed the same, we would be reassured that nothing deadly was threatening and could do what we were already doing—trying to help the patient cope with the symptoms and maintain quality of life. My patients seemed to understand, accept, and appreciate my explanations. Of course, I retired before the heyday of alternative medicine; today they might reject my advice, seek care elsewhere, and end up in the clutches of a quack who could offer certainty divorced from reality.

Craving certainty is one of the drivers behind the use of alternative medicine. The mainstream medical doctor tells you that what you have is the common garden-variety low back pain that almost everyone gets at some time during their life, that we don't know what causes it, and that it will subside on its own (50 percent of cases resolve in two weeks, 80 percent in six weeks). All he has to offer is back care advice, pills, and other treatments to keep you a bit more comfortable while you wait for it to run its course. Alternative medicine providers tell you *they know exactly* what caused it, how to fix it, and how to prevent it

from recurring. That certainty is very satisfying to patients. But it's a false certainty. The acupuncturist says it's due to a disturbance of *qi* that he can fix with needles; the chiropractor says it's due to a subluxation that he can fix with manual adjustments; the naturopath offers dietary advice, supplements, stress reduction advice, etc. There is no agreement or consensus on any of it. They don't even critique each other. They don't offer objective truth, only a variety of belief systems.

The craving for certainty persuades patients to accept bogus diagnoses, such as chronic Lyme disease, adrenal fatigue, and systemic yeast infections. These pseudo-diagnoses provide a convenient explanation for any number of vague symptoms. After doctor-shopping for years, patients are delighted to find a health care provider who is certain they have "the answer"—never mind that it's a wrong answer. The provider spends a lot of time with them, has clear treatment plans backed by a bogus but sciencey-sounding rationale, and offers certainty and hope for a cure. They may submit to his quackery for years until the problem spontaneously resolves or until they finally realize they are not getting better under this care. Unfortunately, they may then seek out another quack who is equally certain about another bogus diagnosis.

Science doesn't claim certainty but instead probability. When a scientist says vaccines don't cause autism, the statement is only a convenient shorthand for a more nuanced reality that other scientists understand but laymen don't. There is no way to absolutely prove that vaccines don't cause autism, but studies have consistently shown no link between vaccines and autism—not even a correlation, much less causation. The negative evidence has accumulated to the point that it would be perverse to continue to believe vaccines cause autism, yet some perverse people, including some doctors, reject the scientific evidence and continue to trust ideology and anecdote instead of science. "My child was diagnosed with autism right after he got the MMR vaccine" creates a certainty in the parents' minds that controlled scientific studies can't compete with.

Nothing engenders certainty more than personal experience. "It worked for me" sounds very impressive, but it may not be true. Maybe it worked, but maybe it didn't. There are a lot of other possible explanations. What you experienced was only this: you had a symptom, you tried a remedy, and your symptom went away. It might have gone away without any treatment, it might have gone away because of the treatment, or it might have gone away despite the treatment—which might have been somewhat harmful. Assuming it "worked" is an example of the *post hoc ergo propter hoc* logical fallacy, i.e., assuming that because Y followed X, X must have caused Y. If you applied that kind of thinking to the rooster who crows just before sunrise, you would conclude that the crowing was what made the sun come up! Things do get better without treatment. Before antibiotics, there were people who survived pneumonia. Spontaneous remissions occur, even in advanced cancers. Mammography studies have estimated that as many as 22 percent of breast cancers undergo spontaneous remission.[2]

The certainty of belief triumphs over the uncertainty and provisional nature of science. Science does not pretend to have final answers, absolute truth, or absolute proof. Its conclusions are always provisional, especially in medicine. They are always open to revision when better evidence comes along. That leads some people to distrust science, because it seems to be always changing its mind. But that's a virtue, not a defect. As it responds to better evidence, it corresponds more and more to reality.

Certainty interferes with science. "Integrative medicine" guru Andrew Weil set up tests of osteopathic manipulation for ear infections, and when the experiments showed no effect, he said, "I'm sure there's an effect there. We couldn't capture it in the way we set up the experiment." He couldn't accept that there might not be anything to capture.

I have often thought that certainty is the root of all evil, or at least the biggest problem facing humanity. A few years ago, two women came to my door. I didn't talk to them long enough to find out which religion they were proselytizing for, but I was intrigued by their approach. They asked if I knew what the biggest problem facing the world today was, and I answered that it was certainty, people who were absolutely sure they were right about something. They agreed with me, saying, "I know just what you mean." They didn't realize I was talking about them.

Unreasonable certainties have led to conflicts in medicine, politics, religion, and every other sphere of human interaction. What if we could all embrace uncertainty and ambiguity? What if religious believers were less dogmatically certain that God exists and that theirs is the one true religion? Might we see an end to religious persecution, religious conflicts, and dogmatic enforcement of dietary and clothing rules? Might acceptance of uncertainty facilitate workable compromises between opponents such as Democrats and Republicans, Jews and Arabs? Might racial and sexual prejudices and hate crimes diminish? What if everyone rejected dogmatic certainties around issues such as abortion, same-sex marriage, gun control, LGBTQ rights, evolution, climate change, and vaccination? Wouldn't the world be a better place?

Richard Feynman said it best: "I can live with doubt and uncertainty and not knowing. I have approximate answers and possible beliefs and different degrees of certainty about different things . . . . It doesn't frighten me."

Medicine is more uncertain than most sciences. It is an applied science that often has to rely on insufficient information, probabilities, and considerable guesswork. There are degrees of certainty. In medicine, I am uncertain about which diet is healthiest, but I am reasonably certain that the following is good, evidence-based advice: exercise more, eat less, and don't smoke.

Uncertainty is the most realistic stance in medicine as well as in politics and societal problems. Can we learn to live with uncertainty and ambiguity? I'd like to think so, but I'm not certain. ■

Notes

1. https://psycnet.apa.org/doiLanding?doi=10.1037%2F0022-3514.77.6.1121

2. https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/773446

LEAVE *a* LEGACY *of* REASON

Imagine a future where science and reason serve as the foundation for our lives.

A future where free expression is guaranteed everywhere around the world.

A future where old sectarian divisions have been overcome by the common bond of secular ideals.

This is the future CFI is working toward. Together, we can achieve it. It's never too early to consider a planned gift—*a legacy of reason*.

Call today to reserve your copy of our new gift-planning brochure—a helpful guide through the many options available to you.

Then speak to your trusted financial advisor or attorney. It's as simple as that.

IT'S EASY

call **1-800-818-7071 x428**
for your copy of this valuable information,
or email **lfoster@centerforinquiry.org.**
There's no obligation.

SECULAR FUTURE SOCIETY · A LEGACY OF REASON

Stuart Vyse is a psychologist and author of *Believing in Magic: The Psychology of Superstition*, which won the William James Book Award of the American Psychological Association. He is a fellow of the Committee for Skeptical Inquiry.

Are Atheists Sadder but Wiser?

Recently a friend and colleague posted a LiveScience article on Facebook that suggested atheists are more intelligent than religious believers (Geggel 2017), and soon I was drawn into one of those sticky internet conversations that rarely work out well. The article was based on a 2013 meta-analysis of sixty-three studies of the relationship of religious belief to intelligence, and the authors found a "significant negative association between intelligence and religiosity" (Zuckerman et al. 2013, 325). To their credit, my secular colleagues reacted with skepticism toward the article's conclusion and pointed to friends and coworkers they knew who were both religious and very intelligent. Skepticism that is potentially against self-interest is particularly admirable, but as I quickly pointed out—while trying not to be too annoying—anecdotes are a weak form of evidence. For obvious reasons, this is a fraught area, but after coming across some recent research that sheds light on the topic, I have rashly decided to wade back in.

IQ Disclaimer

I should begin by acknowledging that any discussion of intelligence or IQ is going to be difficult. There are disputes about racial differences, sex differences, whether there are multiple intelligences, and whether the concept of intelligence is meaningful at all. Finally, there is a tendency among many people to essentialize IQ, depicting it as a quantity that is both fixed at birth and immutable. This is decidedly not the case. The so-called Flynn Effect, discovered by intelligence researcher James Flynn, showed a pattern of increasing intelligence scores over generations that could not be explained by genetics, and subsequent research has shown that educational interventions can produce substantial increases in IQ (Shenk 2017; Skuy et al. 2002). All this leads to questions about what we are talking about when we talk about intelligence.

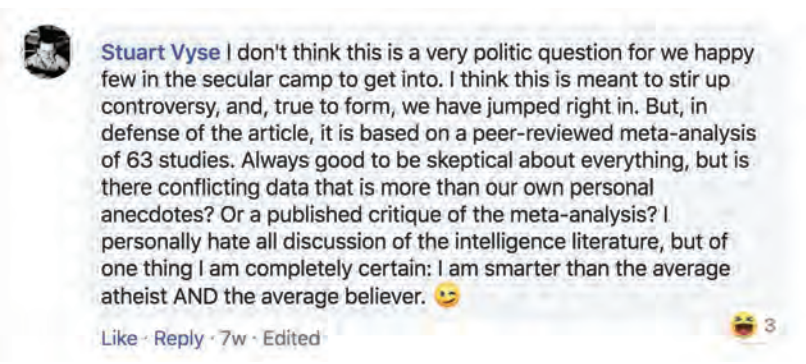
Researchers continue to be interested in intelligence test scores because they are related to a number of life outcomes, such as educational attainment, occupational status, and income (Ceci and Williams 1997; Spinks et al. 2007), and as the LiveScience article suggests, the general public is also interested in intelligence and continues to use the construct in everyday conversation (e.g., "Aunt Rachel is really *smart*!"). So, having briefly laid out the caveats, let's return to religion.

Two Stories about the Psychology of Religious Belief

There are two important findings in the psychology of religion that we should look at together. First, as suggested by the LiveScience article, there is evidence that, on average, atheists and agnostics are more intelligent than religious people. Second, one of the most robust findings in the psychology of religion suggests that religious people are happier than nonreligious people.

The Intelligent Atheist

First, the issue that launched this column: the relationship between religious belief and intelligence. There is a fairly long history of research on this question, particularly in recent years, and, in general, the results are consistent. A 2009 study assessed religiosity and average intelligence at the national level for 137 countries and found a substantial correlation between average intelligence and disbelief in a god (Lynn et al. 2009). This study must be taken with a big grain of salt, because the intelligence measures were developed for use with Europeans and may not have been appropriate for those in other countries. One interesting finding of this study


Stuart Vyse I don't think this is a very politic question for we happy few in the secular camp to get into. I think this is meant to stir up controversy, and, true to form, we have jumped right in. But, in defense of the article, it is based on a peer-reviewed meta-analysis of 63 studies. Always good to be skeptical about everything, but is there conflicting data that is more than our own personal anecdotes? Or a published critique of the meta-analysis? I personally hate all discussion of the intelligence literature, but of one thing I am completely certain: I am smarter than the average atheist AND the average believer.
Like · Reply · 7w · Edited
3

Credit: Danny Birchall on Flickr.com.

was that the United States was an outlier because it had an unusually low level of disbelief in god (10.5 percent) for a relatively high intelligence country.

A methodologically stronger study looked at the fifty U.S. states and found a substantial negative correlation between the average intelligence and average religiosity of a state (Pesta et al. 2010). Finally, the 2013 meta-analysis mentioned above combined the findings of sixty-three studies and also found a negative relationship (Zuckerman et al. 2013). The studies included in the meta-analysis were mostly from Western countries; as a result, the findings are limited to that region of the world. In addition, although the relationship is statistically significant (i.e., not due to chance), it is not very strong. In other words, if you tried to use a person's IQ to predict their level of religiosity, it would not do a very good job—which explains why we all know many very intelligent religious people.

Although the evidence for this relationship is fairly reliable, as you might imagine, it has not gone undisputed. In a recent article, researchers from Australia, the United Kingdom, the Netherlands, and Sweden (Dutton et al. 2019) reanalyzed data from previous studies and suggested that the negative relationship between intelligence and religiosity was not a function of *g*, a general form of intelligence, but was instead produced by more *specific forms* of intelligence (e.g., vocabulary, spatial relations). Unfortunately for the two samples they studied, the relationships with specific intelligences were not consistent with each other, making it difficult to draw a clear conclusion. The authors went on to make the surprising speculation that the relationship between intelligence and religiosity is produced by autistic symptoms—a claim that, in my view, needs much stronger evidence. In any case, their research does little to alter the overall picture: On average, people who are nonbelievers are slightly more intelligent than believers.

There are several hypotheses about why intelligence might be related to religious belief. One proposal is that atheism is a form of nonconformity. In many communities, religious belief would be a conformist choice, and there is empirical evidence that intelligent people are less likely to conform (Rhodes and Wood 1992).

Another theory suggests that nonreligious people use more analytical thinking, which is also related to intelligence. According to the popular dual process theory of cognition, we employ two reasoning systems: System 1, which is quick and intuitive; and System 2, which is slower, more deliberative and capable of analytical reasoning and calculation (Kahneman 2011). Researchers have developed a short test to measure analytical reasoning called the Cognitive Reflection Test (CRT; Frederick 2005). It has just three questions:

1. A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? _____ cents.
2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? _____ minutes.
3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? _____ days.

For most people, the CRT can be mastered only by engaging the slower but more powerful machinery of System 2 and cannot be solved using the simple intuitive heuristics of System 1. (By the way, the answers to the CRT are five cents, five minutes, and forty-seven days.)

A long series of studies has shown that atheists score better on tests of analytical reasoning. For example, psychologist Gordon Pennycook (who spoke at CSICon 2019) and colleagues recently reported the results of four new experiments testing this effect and also conducted a meta-analysis of thirty-one studies (including the four new ones) and found a consistent relationship of higher scores on analytic reasoning among agnostics and atheists (Pennycook et al. 2016). However, it is important to remember that, like the studies of intelligence and religious belief, this relationship was statistically significant but not very large in a practical sense. Other factors must contribute to religious belief or nonbelief, and there are many religious people who use more analytical reasoning.

The Happy Believer

More research is needed to understand the relationship between intelligence and nonbelief, but in an effort to provide a balanced picture, I should mention the other consistent relationship with religious belief: happiness. Lest nonbelievers become smug, there is a substantial body of research showing that religious people are happier than nonreligious people (Diener and Biswas-Diener 2008). For example, a study based on the European Social Survey between 2000 and 2008 measured happiness by asking the question, "Taking all things together, how happy would you say you are?" (Fidrmuc and Tunalı 2015). Survey respondents answered on a scale from zero "extremely unhappy" to ten "extremely happy." Because the survey also recorded many demographic questions, the researchers were able to duplicate several findings observed in previous studies, including that men were generally less happy than women and that higher education was associated with greater happiness even when the effects of income and employment status were controlled. In addition, married couples were happier than those who are not married, and rural people were happier than urban. Past research has shown that adults with children have lower happiness levels than adults without children, and consistent with this finding, the European study showed that middle-aged people were less happy on average than either younger or older adults. Finally, after controlling for many other variables, the researchers found that Europeans who held religious or spiritual beliefs were happier than those who did not.

Sometimes investigators find that aggregate results at the level of a state or country conflict with those at the level of the individual, and this vexing situation applies to studies of religious engagement. For example, U.S. states with higher religious engagement have higher crime rates, but when measured at the level of the individual, higher religious engagement is associated with lower crime rates (Myers and Diener 2018, 221). Go figure. This kind of paradoxical pattern of aggregate and individual results holds for the relationship of religion with several negative social variables, such as smoking, teen pregnancy, and life expectancy—leading

one pair of researchers to ask, "Why might there be this sharp contradiction between religious people being happy and healthy, and religious places being anything but?" (Deaton and Stone 2013, 595).

A similar paradox is found in the case of religion and the positive variable, happiness. A study of religious engagement among 152 countries found that higher religious engagement was associated with lower levels of happiness (Myers and Diener 2018, 222), but a U.S. study of 57,000 respondents to the General Social Survey of the National Opinion Research Center showed a consistent increasing percentage of happy people with higher levels of religious engagement (see Figure 1).

So, according to the evidence, atheism appears to be a choice to be sadder but wiser—but in fact we are not justified in drawing that conclusion. It is important to recognize that all the evidence cited in this column is correlational, which means we cannot identify what causes any of these relationships—only that certain variables travel together. In the case of intelligence and religious belief, it seems more likely that intelligence pulls people away from religion rather than religion or atheism influencing level of intelligence. But we cannot know this for certain because there could be some third thing that we have not identified that controls both intelligence and religious belief.

In the case of religion and happiness, the causal arrow is even more difficult to draw. Are happy people attracted to religion, or does religious engagement make people happier? Or is it some unknown third thing that makes people both happier and more religious—or the reverse? These are complicated questions that we are not able to answer yet. The clearest thing we can say is that whether you choose atheism or religion, the outcome will be a mixed blessing. ■

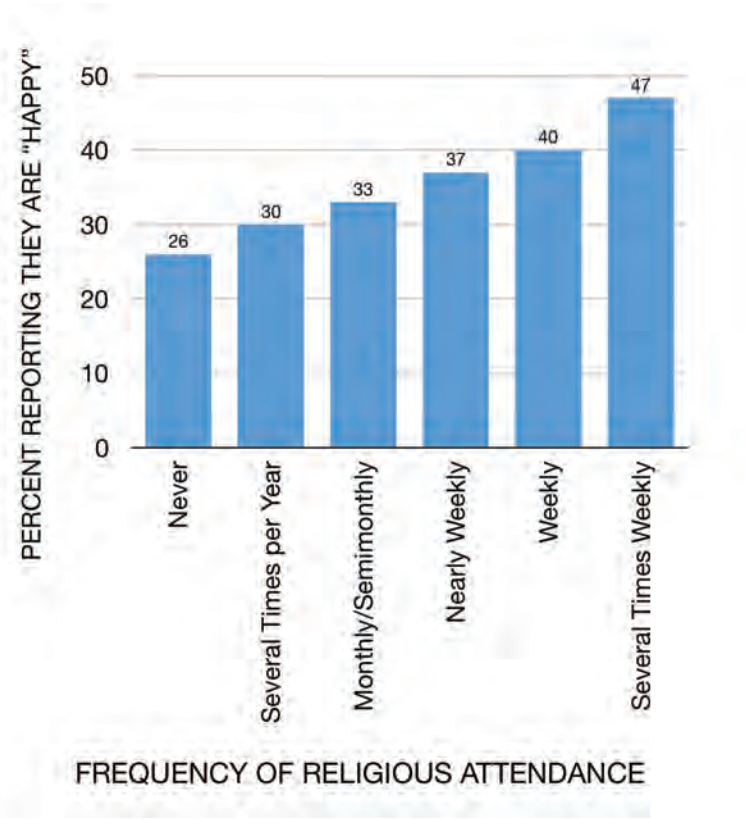


Figure 1. The relationship of reported happiness to the frequency of religious attendance. Based on General Social Survey data reported by Myers and Diener (2018, Figure 6).

References

Ceci, Stephen J., and Wendy M. Williams. 1997. Schooling, intelligence, and income. *American Psychologist* 52(10): 1051–58. Available online at https://doi.org/10.1037/0003-066X.52.10.1051.

Deaton, Angus, and Arthur A. Stone. 2013. Two happiness puzzles. *American Economic Review* 103(3): 591–97.

Diener, Ed, and Robert Biswas-Diener. 2008. *Happiness: Unlocking the Mysteries of Psychological Wealth.* New York: Blackwell.

Dutton, Edward, Jan te Nijenhuis, Daniel Metzen, et al. 2019. The myth of the stupid believer: The negative religiousness–IQ nexus is not on general intelligence (g) and is likely a product of the relations between IQ and autism spectrum traits. *Journal of Religion and Health*. Available online at https://doi.org/10.1007/s10943-019-00926-3.

Fidrmuc, Jan, and Çiğdem Börke Tunalı. 2015. Happiness and religion. CESIFO working paper No. 54375437. Available online at https://doi.org/10.1007/978-3-319-75807-7_12.

Frederick, Shane. 2005. Cognitive reflection and decision making. *Journal of Economic Perspectives* 19(4): 25–42.

Geggel, Laura. 2017. Why are atheists generally smarter than religious people? LiveScience (June 5.) Available online at https://www.livescience.com/59361-why-are-atheists-generally-more-intelligent.html.

Kahneman, Daniel. 2011. *Thinking, Fast and Slow.* New York: Farrar, Straus and Giroux.

Lynn, Richard, John Harvey, and Helmuth Nyborg. 2009. Average intelligence predicts atheism rates across 137 nations. *Intelligence* 37: 11–15. Available online at https://doi.org/10.1016/j.intell.2008.03.004.

Myers, David G., and Ed Diener. 2018. The scientific pursuit of happiness. *Perspectives on Psychological Science* 13(2): 218–225.

Pennycook, Gordon, Robert M. Ross, Derek J. Koehler, et al. 2016. Atheists and agnostics are more reflective than religious believers: Four empirical studies and a meta-analysis. *PLoS ONE* 11(4): 1–18. e0153039. Available online at https://doi:10.1371/journal.pone.0153039.

Pesta, Bryan J., Michael A. McDaniel, and Sharon Bertsch. 2010. Toward an index of well-being for the fifty U.S. states. *Intelligence* 38(1): 160–68. Available online at https://doi.org/10.1016/j.intell.2009.09.006.

Rhodes, Nancy, and Wendy Wood. 1992. Self-esteem and intelligence affect influenceability: The mediating role of message reception. *Psychological Bulletin* 111(1): 156–171.

Shenk, David. 2017. What is the Flynn Effect, and how does it change our understanding of IQ? *Wiley Interdisciplinary Reviews: Cognitive Science* 8: 1–3. Available online at https://doi.org/10.1002/wcs.1366.

Skuy, Mervyn, Anthony Gewer, Yael Osrin, et al. 2002. Effects of mediated learning experience on Raven's Matrices scores of African and Non-African university students in South Africa. *Intelligence* 30(3): 221–32. Available online at https://doi.org/10.1016/S0160-2896(01)00085-X.

Spinks, Ruth, Stephan Arndt, Kristin Caspers, et al. 2007. School achievement strongly predicts midlife IQ. *Intelligence* 35(6): 563–67. Available online at https://doi.org/10.1016/j.intell.2006.10.004.

Zuckerman, Miron, Jordan Silberman, and Judith A. Hall. 2013. The relation between intelligence and religiosity: A meta-analysis and some proposed explanations. *Personality and Social Psychology Review* 17(4): 325–54. Available online at https://doi.org/10.1177/1088868313497266.

Matthew Nisbet is professor of communication, public policy and urban affairs at Northeastern University and is a monthly columnist at *Issues in Science and Technology* magazine.

The Mindful Climate Writer:
Finding My Voice in a Culture of Extremes

I spend most of my time studying and writing about climate change politics. It is often a paralyzing experience; not only is climate change a grave threat, but it is also one of America's most polarized political debates.

I have come to appreciate that avoiding the easiest, most comfortable narrative—one that narrowly appeals to a particular social identity or political tribe—demands a special discipline. It requires clearing away competing noise, reserving time for deep reading and critical reflection. Only a focused mind can write truthfully about flawed assumptions, misplaced choices, and wrongheaded ideas, no matter their popularity or source. To take into account a wide range of factors and perspectives, and to reconcile differing visions of a good society, also requires an intellectual to stop worrying about critical responses or negative reactions to what he or she writes.

As controversial as it sounds, to become a voice for moderation in a culture of extremes, I realized that I had to quit social media and shift most of my reading back to print. Playing to the rawest elements of human nature, social media have done great damage to American politics, details Siva Vaidhyanathan in 2018's *Anti-Social Media*, destroying our ability to think collectively, maintain sustained focus on pressing problems, and discuss productively across lines of difference. Artificial intelligence–driven platforms serve up a constant stream of news and commentary that reflects our existing biases and beliefs rather than content that might challenge them. Because it kidnaps our attention, the most inflammatory, most outrageous, and most catastrophic content is rewarded by social media algorithms, ensuring that it travels the furthest.

Because social media is a place where we find comfort in our tribal identity, posting, liking, and spreading ideologically affirming content about climate change generates social value, regardless of the source, quality, or veracity of the content we may be sharing. And it is not just social media; it is the online immersion itself that is the death of the climate change intellectual and writer, disrupting our ability to acquire the specialized knowledge and insights needed to write lucidly and sharply about the wickedly complex problem.

I have come to appreciate that avoiding the easiest, most comfortable narrative—one that narrowly appeals to a particular social identity or political tribe—demands a special discipline.

As the mental circuits devoted to constant online multitasking strengthen, the circuits used for reading and concentration erode, writes Nicholas Carr in 2011's *The Shallows: What the Internet Is Doing to Our Brains*. The altered brain consequently finds it more difficult to concentrate and read deeply, as numerous studies in subsequent years have shown (Loh and Kanai 2016). The price of zipping around on the web and social media is a loss in our depth of thinking, the essential trait of the intellectual and writer.

We Used to Be Human

By 2016, journalist Andrew Sullivan had spent the previous fifteen years devoting himself to writing a blog titled *The Dish*, an occupation that included posting multiple blog posts a day seven days a week, constantly tracking the latest online hot take or trending story. In a cover story in *New York* magazine titled "I Used to Be a Human Being," Sullivan (2016) described himself as a "very early adopter of what we might now call living-in-the-web." But his obsession took a severe toll on his psyche, relationships, and health, he wrote. He could no longer read books, his mind and fingers "twitched for

a keyboard," and he suffered from chronic respiratory infections. Even though Sullivan spent every day alone at a keyboard, he felt as if he were in a "constant cacophonous crowd of words and images, sounds and ideas, emotions and tirades—a wind tunnel of deafening, deadening noise." Sullivan quit his blog and returned to long-form journalism, describing in the article his months-long recovery that began with a silent meditation retreat.

Two years earlier, Vox.com climate writer David Roberts (2014) described a similar experience. After a decade of writing online, Roberts found that almost all his time was now spent on Twitter, offering his 35,000-plus followers a steady diet of commentary. He felt twitchy if he wasn't close to his smart phone, taking it with him to bed and even to the bathroom. "The core of my job—researching, thinking, writing at greater-than-140-character length—I could accomplish only in the middle of the night, when things calmed down [on Twitter]," he wrote for *Outside* magazine. "I spent more and more hours working, or at least work adjacent, but got less and less done." Even when playing with his children, Roberts never felt fully present. His life as an online writer had mutated into full-time "life-casting," as he described it, "a manic, full-time performance of Internet David Roberts."

So he took a year-long sabbatical from Grist.org where he was working at the time. He read the literature on internet addiction, began a yoga practice, experimented with meditation, and took long walks outdoors. After several months, he was finally able to spend hours at a time absorbed in a single activity. "My mind felt quieter, less jumpy," he wrote. When he returned from his sabbatical, Roberts was determined to live up to the "challenge of our age, in work and in life: to do one thing at a time, what one has consciously chosen to do and only that, and to do it with care and attention."

The Addiction Machine

Recognizing the harm that social media is doing to our minds and to our collective ability to address climate change and other issues, in 2018 I began to experiment with various methods for minimizing the impact of social media on my life, even as I used Facebook and Twitter to successfully promote my ideas, articles, and new research.

In one strategy, I wrote out a very long password in a notebook, so that when logging on to Twitter, I had to do so with a specific intention and purpose in mind. On Facebook, I pared down my list of "friends" from more than 800 to just sixty-five, half of whom were relatives. But as Roger McNamee, a one-time mentor to Mark Zuckerberg, writes in his recent book *Zucked*, when we try to use social media minimally and mindfully, we run up against an impossible task.

The price of zipping around on the web and social media is a loss in our depth of thinking, the essential trait of the intellectual and writer.

Tech companies such as Facebook have recruited some of the world's brightest minds to create an unbeatable chess game in which we battle artificial intelligence and algorithms with almost perfect information about us—machine learning employed with the specific intention to keep us addicted to distraction. So, in early 2019, realizing the battle that all of us are losing with great cost to our health, our careers, and society, I deleted my Facebook and Twitter accounts.

At the time I was reading the Roman stoic Seneca, who as a busy senator and advisor to emperors still reserved time for the life of the mind as a prolific philosopher and essayist, influencing countless subsequent generations of intellectuals and writers. In 50 CE, he wrote in his essay on the shortness of life and how to spend it wisely: "No activity can be successfully pursued by an individual who is preoccupied … since the mind when distracted absorbs nothing deeply but reflects everything which is, so to speak, crammed into it." I eventually rejoined Facebook and Twitter, but my months-long absence had greatly benefited my writing.

A More Focused Life

"How we spend our days is, of course, how we spend our lives," observes Annie Dillard (2013) in *The Writing Life*. Today, I spend my days surrounded by the stillness of my office or within the sacred sanctuary of a library with no digital screen in sight, filling Moleskin notebooks with observations, engaged in the type of deep reading and immersion necessary to tie together insights and arguments into a fresh web of analysis.

Swimming laps at a pool or on a long walk, I often sort out the complexities of an article. During my daily yoga practice, I quiet the mind, easing the anxieties that afflict every writer. Culturally, we have forgotten that writing is not typing. There is a creative link between the intellect and the pen that I have rediscovered by writing the first draft of an article on a yellow legal pad, completely absorbed in the craft of composition. As I write, I no longer feel the gnaw of anticipation over how people might react on social media. My mind is free to follow the evidence, to scrutinize the most deeply held assumptions, and to dare readers to see clearly, reimagining what is possible. ■

References

Carr, N. 2011. *The Shallows: What the Internet Is Doing to Our Brains*. New York: WW Norton & Company.

Dillard, A. 2013. *The Writing Life. Landmark Essays on Writing Process*. New York: HarperCollins, 225–226.

Loh, K.K., and R. Kanai. 2016. How has the internet reshaped human cognition? *The Neuroscientist* 22(5): 506–520.

McNamee, R. 2019. *Zucked: Waking Up to the Facebook Catastrophe.* London: Penguin Press.

Roberts, D. 2014. Reboot or die trying. *Outside* (September).

Sullivan, A. 2016. I used to be a human being. *New York Magazine* 19.

Vaidhyanathan, S. 2018. *Antisocial Media: How Facebook Disconnects Us and Undermines Democracy.* Oxford University Press.

[SKEPTICAL INQUIREE BENJAMIN RADFORD

Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or coauthor of a dozen books, including *Investigating Ghosts: The Scientific Search for Spirits*.

Have I Ever Seen a Ghost?

Q: **Have you ever investigated a haunting you could not explain or you thought was real? Have you ever seen a ghost?**

—D. Sheehan

A: As a longtime investigator into ghostly phenomena (that is, phenomena *attributed to* ghosts not necessarily *caused by* ghosts), I've been asked some version of this question countless times. It's a legitimate and perfectly reasonable question with a somewhat nuanced epistemological answer. Most ghost hunters (and between two and six out of ten Americans, depending on the poll) will tell you that they have indeed seen a ghost and proceed to describe one or more vivid—though typically undocumented—experiences with what they believe to be a ghost.

I've investigated many dozens of ghost reports, ghost photos, and videos across the country and around the world, documented on television shows and in books, articles, and elsewhere. Many, perhaps most, can be plausibly explained, but surely—I've often heard—there are a few that can't be explained, some that *must* be real … right?

Like UFO enthusiasts and Bigfoot hunters, ghost believers will often admit (as if demonstrating their skepticism) that many sightings are misidentifications of normal phenomena, while others are downright hoaxes. The remaining sightings, that small portion of reports that can't be explained away, intrigue researchers. The issue is then essentially turned into the claim that "where there's smoke, there's fire."

But is it true that, given the mountains of purported ghost sightings, photos, EVP recordings, and so on, there *must* be something there? I propose not; the evidence suggests that there are enough sources of error (bad data, flawed investigation methodology, misperceptions, misinterpretations, hoaxing, etc.) that there does not have to be—nor is there likely to be, based on the evidence so far—demonstrably genuine ghost experiences lurking amid the unsubstantiated cases.

The claim assumes that the unsolved reports and sightings are qualitatively different than the solved ones. But paranormal research is littered with cases that were once deemed irrefutable evidence only to fall apart upon further investigation or hoaxer confessions. There will always be cases in which there simply is not enough evidence to prove something one way or the other. A lack of information cannot be used as evidence for a claim, lest we fall into the argument from ignorance fallacy; "I experienced something I can't explain" does not logically translate to "I experienced a ghost."

In their book *Ghostly Encounters: The Hauntings of Everyday Life*, Dennis and Michele Waskul examine how people experience ghosts in everyday life. They found that many people

> were not sure that they had encountered a ghost and remained uncertain that such phenomena were even possible, simply because they did not *see* something that approximated the conventional *image* of a "ghost." Instead, many of our respondents were simply convinced that they had experienced *something* uncanny—something inexplicable, extraordinary, mysterious, or eerie. (20)

So, we see why verifying ghostly phenomena is problematic—even for non-skeptics. Many people who will go on record as having a ghostly *experi-*

ence didn't necessarily see anything that most people would recognize as a classic "ghost" and in fact may have had completely different experiences whose only common factor is that they could not be readily explained.

As I describe in my book *Investigating Ghosts: The Scientific Search for Spirits*, context is critically important to understanding such claims: Something "unknown" or "unexplained" in the context of a reputedly haunted house will be interpreted as a ghost, while something "unknown" in the context of a wilderness hike may be interpreted as Bigfoot, and so on. Because as a science-based investigator I don't approach a given location or experience with an *a priori* assumption about the existence of ghosts (either generally or at the location), I am—for well-established psychological reasons—less likely to interpret what I see as a ghost.

There are two main factors involved here: the inherently ambiguous nature of ghostly phenomena and the inherently fallible nature of human perception. Ghostly phenomena are universally mundane and ambiguous. Dramatic, sensational accounts of ghostly or demonic encounters are the stuff of fiction. In other words, in the real world, verifiable "ghostly phenomena" appear at a level indistinguishable from mundane events and misperceptions or misinterpretations. Note the stark lack of good evidence, even among the glut of so-called reality ghost-hunting television shows. They're larded with "spooky" faint lights and sounds and pareidolia-created shadowy faces and figures—all relentlessly hyped and made watchable only by Herculean efforts at video turd polishing.

Given my investigations and what I know about the fallibility of human perception—including, of course, my own—I'd be hard pressed to confidently assure anyone that I'd seen a ghost *per se*. To state definitively or emphatically that I had seen a ghost would be both arrogant and intellectually dishonest. We don't know for certain what ghosts are—or, more accurately, what unique and distinctive experiences make up a ghostly encounter—so we can't really know for sure that apparent ghostly activity is not really an invisible gremlin, telekinesis, or some other unknown, unfalsifiable force.

Skeptics are often accused of having closed minds, but in fact the opposite is true. Being open-minded means being open to the possibility that you're wrong, that you may have made a mistake or misunderstood something that you saw, heard, or experienced. For a person to state with any certainty that what he or she saw was a ghost, he or she is in effect claiming to have carefully considered—and strongly if not definitively ruled out—all other possible explanations. The person is saying that he or she is so deeply knowledgeable about all the environmental, psychological, and other circumstances of their experience or evidence that the *only possible explanation* is an unseen spirit.

This doesn't mean I'm closed-minded. If I experienced something I genuinely cannot explain or that clearly defies the laws of physics (a chair flying across the room via some unseen force, for example, or cabinet doors opening and closing violently in my presence), I'd be both delighted and eager to investigate—and call it unexplainable if I thought it was. It would be easy (and potentially very profitable) to simply say that I had seen a ghost or at least good evidence of one. It is entirely possible that one day I will experience something I truly think is beyond any scientific explanation; if and when that happens, I will dutifully report it.

It's often said that skeptics such as me are so personally, professionally, and epistemologically invested in skeptically examining claims that our minds are closed to real evidence that would challenge our worldviews. This is of course wrong. I would be delighted to empirically prove the existence of chupacabras, lake monsters, psychic powers, or ghosts. Nor have I staked my reputation on ghosts not existing. I have never denied the possibility of ghosts, so if I sincerely stated that I believed I had seen a ghost, I would not be contradicting myself or my previous research; I'd be updating it—as science does.

So: Have I ever seen a ghost? I don't know—and I don't know how I *would* know if I had. I'm open to the possibility but far better evidence will need to … materialize. ■

Naturopathic medicine is not any kind of medicine, and its practitioners are nothing short of quacks. I know because I used to be one. Herein lies my story.

Britt M. Hermes

Six years ago, I was a quack.

From 2011 until 2014, I was a licensed naturopathic doctor in the United States. Thanks to poor legislation in many states, I could advertise as a primary care physician, write prescriptions, and bill insurance companies. I called myself "Dr. Britt." In Arizona, I worked outside the health insurance system and catered to a patient population interested in aligning chakras and detoxing with diets and enemas. While I was more drawn to using *real* medical treatments rather than esoteric therapies, I was happy to be employed by the renowned naturopathic cancer "specialist" who owned the clinic.

I likely would have gone the entirety of my career as a naturopath if I hadn't unexpectedly found myself in a nerve-rattling situation. I quit after discovering my boss had been importing a non–Food and Drug Administration (FDA) approved drug called Ukrain and administering it to cancer patients (Thielking 2016; Arizona Naturopathic Physicians Medical Board 2015). His patients would get regular intravenous injections of Ukrain despite, in some cases, being discharged by their medical oncologists due to the severity of their disease. Others had chosen him for first line treatment. They flocked to him because his credentials included FABNO (Fellow of the American Board of Naturopathic Oncology).[1]

It didn't strike me as unusual that the packages, containing dozens of old-fashioned glass ampules, were marked with foreign postage. I assumed patients had been given informed consent, as they were spending thousands of dollars on the treatments. We all trusted him. One day the shipments stopped. My boss said, "They were probably confiscated."

It is potentially a federal crime to give an unapproved medication to patients (Friedman 2018; FDA 2019). Under my boss's orders, I had assisted with the administration of Ukrain, which is advertised as a natural cancer drug that cures almost any type of cancer and does not harm healthy cells (Nowicky 2019). Although this type of marketing is generally a red flag for a bogus cure, Ukrain does contain compounds that seem to show anti-cancer activity (Ernst and Schmidt 2005). However, it is also associated with life-threatening side effects, such as liver failure, tumor bleeding, and bone marrow toxicity (Boehm et al. 2015; Gansauge et al. 2002; Stickel et al. 2001; Moro et al. 2009). During the time that our patients had been receiving intravenous injections of Ukrain, its manufacturer had been arrested in Austria for charges of fraud—he had been relabeling and continuing to sell expired product ("Ukrainian Chemist" 2015). In 2016, the accused manufacturer was found guilty of serious commercial fraud and sentenced to three and a half years of imprisonment in Vienna, but he has appealed the verdict, and court proceedings are still ongoing (Der Standard 2016).

Under my boss's orders, I had assisted with the administration of Ukrain, which is advertised as a natural cancer drug that cures almost any type of cancer and does not harm healthy cells.

I learned this information on a Friday. That same weekend, I submitted a complaint to the Arizona Naturopathic Board of Examiners. Monday, I reported the events to the state's attorney. That afternoon, I confronted my boss and quit. Later that same evening, I received a call from a respected leader in the naturopathic profession. He urged me not to go to the authorities, pleading for me to reconcile with my boss because I was a "*naturo*-path, after all."

Was this code for dismissing my ethical duty to report a crime in honor of some kind of great, naturopathic philosophy? From this conversation, I lost my faith. This event forced me to confront the reality that patients whom I had come to deeply care about were being cheated out of money and duped into thinking that a so-called "natural" drug would help or even cure them.

I spent the next few months seeking out information that was scientifically critical of naturopathy and alternative medicine. I began scrutinizing my naturopathic education and training and, in parallel, learning more about evidence, standards of care, and medical ethics. After reading some great books and blogs, sending emails to leaders in the skeptical community—including Dr. Edzard Ernst and Jann Bellamy—and after a lot of tears, I concluded that naturopathic medicine is a scam. I was a fake doctor. How could I have been so wrong?

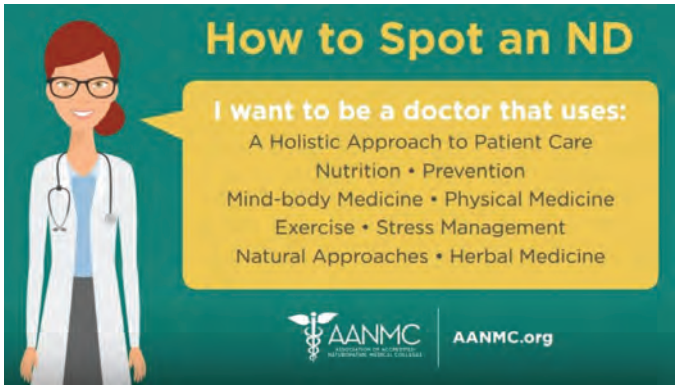

How to Spot an ND
I want to be a doctor that uses:
A Holistic Approach to Patient Care
Nutrition • Prevention
Mind-body Medicine • Physical Medicine
Exercise • Stress Management
Natural Approaches • Herbal Medicine
AANMC
AANMC.org

image:www.aanmc.org/a

Image used on the Association of Accredited Naturopathic Medical Colleges (AANMC) website

What Is Naturopathy?

Naturopathy is based on magic. Its origins trace back to a late nineteenth-century belief in vitalism (Whorton 2002; Brown 1988). In this worldview, all living beings embody a sort of supernatural energy force that is responsible for making you healthy or sick. Naturopaths refer to this power as the *vis* (Micozzi 2018). Other systems of pre-modern medicine have similar ideas about healing energies. In traditional Chinese medicine, it is called *qi*. In Ayurvedic medicine, it is called *prana* (Tabish 2008).

In naturopathy, the *vis* is manipulated using treatments that are based on food, water, plants, minerals, and physical contact. The mainstay naturopathic therapies are nutrition, hydrotherapy, herbal medicine, spinal manipulation, homeopathy, and traditional Chinese medicine. Some naturopaths utilize methods and substances that are more familiar to modern medicine, including intravenous injections and pharmaceutical drugs.

Today, naturopathy has been rebranded as naturopathic medicine. Naturopaths call themselves naturopathic doctors, or NDs for short. The profession has been somewhat successful in passing itself off as a credible medical specialty that claims to blend the best of both modern and traditional medicine. To get here, naturopaths aggressively and relentlessly lobby for laws to allow them to be licensed as medical practitioners. Almost half of the U.S. states license or regulate naturopaths, and five Canadian provinces regulate naturopathy. Current scopes vary wildly. In Arizona, an ND is considered a "physician" and can prescribe controlled substances and perform minor surgeries. In Alaska, an ND is restricted to

providing nutritional advice, counseling, herbs, homeopathy, and physical therapies. Contrary to what naturopaths will tell you, regulating the naturopathic profession does not make the practice of naturopathy safe (Hermes 2017; Hermes 2016b; Weeks 2016).

A licensed ND needs to have graduated from a program accredited by the Council on Naturopathic Medical Education (CNME), which is granted programmatic accrediting status by the U.S. Department of Education. Many—especially NDs—often confuse CNME accreditation with government endorsement. In fact, CNME has accrediting power merely because it meets administrative criteria, *not* because the naturopathic curriculum is medically validated or scientifically sound. Tellingly, naturopaths accredit their own programs while shielding the process from outsiders.

Based on my experience, accredited naturopathic programs play fast and loose with biomedical science.

I concluded that naturopathic medicine is a scam. I was a fake doctor. How could I have been so wrong?

Much of the curriculum is homeopathy, herbalism, hydrotherapy, craniosacral therapy, chiropractic manipulation, and naturopathic philosophy. In fact, when I started my master's of science program in Germany, which is ironically the birthplace of naturopathy, I was required to retake science courses, including anatomy, histology, and immunology.

Clinical training is mandated by the CNME to be no less than 850 hours of direct patient care (Council on Naturopathic Medical Education 2016). I reviewed my clinical training handbook and discovered this benchmark is attainable only through accounting tricks. For example, time counted when students reviewed a case with their peers or when we observed advanced ND students perform physical exams.

ND students are not trained in the same standards of care as medical students. It was common to hear instructors clinically discuss a patient's "vital force" as if this could somehow be detected and improved. Frequently, patients were diagnosed with dubious food allergies,[2] chronic Lyme disease,[3] or adrenal fatigue.[4] Patients would be prescribed an assortment of herbs and supplements—conveniently sold at the clinic's dispensary.

A residency is not required for naturopaths to practice any specialty of medicine, including oncology (Association of Accredited Naturopathic Medical Colleges 2019). After a naturopathic student graduates, he or she may move directly into practice after passing a two-part licensing exam that primarily focuses on naturopathic therapies, such as homeopathy and herbs. A small number of NDs voluntarily complete residencies, which are essentially encores of naturopathic clinical training. These positions are typically two years and are sponsored by naturopathic clinics that provide naturopathic treatments, including alternative cancer therapies, in an outpatient setting. It is not uncommon for naturopaths who call themselves "cancer specialists" start practicing directly after passing their licensing exams.

During my time in naturopathic school, students took one lecture course (about twenty classroom hours) in cancer care. In my course at naturopathic school, I was taught that no natural substance has been proven to cure cancer. Despite this disclaimer, it is easy to find naturopaths advertising natural cancer cures.

Sued for Defamation by a Naturopathic Cancer 'Specialist'

In early 2015, I started blogging at *Naturopathic Diaries* in an effort to help protect patients and other students from falling prey to naturopathy. I quickly became the naturopathic profession's number one enemy.

Sometime in 2016, a webpage misrepresenting my position on naturopathic medicine appeared. The site didn't post untrue statements about me or say anything negative. But it clearly made it seem as though I was an advocate for naturopathic medicine. I quickly learned that about half a dozen domains using versions of my name had been anonymously registered. Some of these domains forwarded to the websites of the American Association of Naturopathic Physicians and the Association of Accredited Naturopathic Medical Colleges. I called the company hosting the brittmariehermes.com page and asked for the email address associated with the account. Surprisingly, a forthcoming representative gave me an email address at natonco.org, the website for the Naturo-

pathic Cancer Society—of which a naturopath named Colleen Huber is president and founder (Hermes 2016a).

I had never heard of Colleen Huber prior to that moment. When I started to look into Huber, I got really sucked down deep into what felt like a pit of despair. Here is what I learned: Huber's Naturopathic Cancer Society is a nonprofit organization that previously claimed to help naturopathic patients raise money for alternative cancer therapies (Huber 2016b; Huber 2017a). Huber also owns a naturopathic clinic called Nature Works Best in Arizona, where she treats cancer patients with intravenous baking soda, megadoses of intravenous vitamin C, and a strict sugar-free diet (Huber 2015). Huber advocates against state-of-the-art oncology, especially chemotherapy and radiation, because she thinks these therapies strengthen cancer (Huber 2016a). Huber's clinic website and charity website previously linked to each other, which provided the impression that a patient of Huber's could use her charity funds to pay for treatments at Huber's clinic (Huber 2017b; Huber 2019a).

Based on my experience, accredited naturopathic programs play fast and loose with biomedical science.

Huber is also the secretary and founding member of a naturopathic ethics review board that goes by multiple names. I later learned, according to a writ submitted by Huber's attorneys, this ethics board approved the cancer research that Huber conducts at her clinic. I should note here that Huber does not use a standardized cancer treatment protocol on her patients (Huber 2015). It all looked sketchy, and truthfully Huber seemed like someone I did not want to legally tangle with. But my views were being misrepresented, and I felt like I needed to act.

In June 2016, I hired an American lawyer to send Huber and one of her colleagues a cease and desist letter, asking Huber to relinquish the domain names to me. The letter went unanswered. About six months later, I decided to take the fight public.

In a blog post from December 2016, I laid out my theory for why I thought Huber, or someone in her close orbit, had purchased the domains of my name. I also wrote about her cancer therapies, charity, and so-called cancer research. I was highly skeptical of the relationship between her charity and clinic, and I also questioned the ethics of her research protocol. Nine months after this post, with the help of a German law firm, Huber sent me a cease and desist letter. Huber wanted me to remove the entire blog post about her and to pay her legal fees, because she claimed I had defamed her.

I hired a German lawyer and responded to this letter. We refused to comply with Huber's demands. I had not done anything wrong, and I found Huber's claims ridiculous. I felt strongly that Huber's treatment methods and research were questionable and that the public was entitled to this information. In September 2017, Huber filed a lawsuit against me in Germany for defamation.

Huber's Cancer Research

Colleen Huber conducts research out of her clinic and claims to have gathered data on the efficacy of her naturopathic cancer treatments. She characterizes her research as "groundbreaking" and states that "no other clinic has such a high documented success rate" (Huber 2016a; Huber 2019b). Her claimed success rate has varied, but on a recent version of her website, she writes, "85% of patients who completed our metabolic treatments and followed our food plan went into confirmed or assumed remission" (Huber 2019b).

Colleen Huber, cancer crusader, sued the author in Germany for defamation. Screenshot from a YouTube video featuring Huber promoting her cancer "treatments."

Regardless of what exact percentage you go by, these results, if true, would be remarkable and are certainly worth examining. In fact, Huber invites the public to do just that. Below these stats, she writes, "You can verify this data for yourself … . We invite you to take a simple calculator and 'crunch the numbers,' to see if you come up with the same percentages that we do" (Huber 2019b).

I did look at the data. And Thomas Mohr, a cancer researcher at the Medical University of Vienna, did crunch the numbers. Mohr calculated an odds ratio of 2:1 (95 percent confidence interval 1.014.40, $p<0.05$) in favor of state-of-the-art therapy (chemo, radiation, etc.). As Mohr puts it, "Patients under natural care have more than a two-fold higher risk to die" (Hermes 2018).

Mohr wanted to do a more robust analysis, because, frankly, we believed that the data Huber gathered is inconsistent and of questionable quality. When Mohr removed questionable data, he found that the odds ratio was 10:1 in favor of state-of-the-art therapy, meaning the risk of death with Huber's therapies appears to be ten times higher compared to those patients who pursue conventional cancer treatments (Hermes 2018).

In the lawsuit, Huber contested Mohr's analysis. She felt that it was defamatory for me to publish the results and wanted these statistics removed from my

blog. Huber took issue with several other points as well, including me calling her a quack, my characterization of the relationship between her charity and clinic, and the cybersquatting (Hermes 2018).

On May 24, 2019, the District Court of Kiel, Germany, ruled against Huber. Reading through the judgment, I really felt like the judge understood me and the point of my blog. The judge wrote:

> The effectiveness of naturopathic treatment is a highly controversial issue among experts. This is exactly what is intended by the Defendant's article. It is a concern for information in connection with an issue that is discussed controversially and emotionally in the public. In medicine, in particular, a comprehensive and critical approach is required so even medical laymen can get an idea of different treatments and approaches. By making critical and partly exaggerated statements the Defendant intends to initiate to a discussion about treatments she regards as dubious.

The judge determined my statements were protected speech under Article 5(1) of the German constitution. The deadline has now passed for Huber to appeal, which means Huber cannot sue me again for these points in Germany, nor can she appeal at a later date.

This event forced me to confront the reality that patients whom I had come to deeply care about were being cheated out of money and duped.

Natural Cancer Therapies Kill

Even though I have won this battle, patients are still at risk of losing. A tragic example of this is Huber's former associate Rebecca Stephan. I found Rebecca's story through a GoFundMe page set-up by her sister-in-law (C. Stephan 2017).

In 2016, Rebecca Stephan was diagnosed with mucinous ovarian cancer. She had surgery to remove the tumor and then was hospitalized due to complications. Her oncologist recommended she start chemotherapy right away. However, Stephan and her family didn't like this treatment plan. She was frail after surgery, and her family worried chemotherapy might kill her. So Stephan began to think about alternatives, writing in a blog post from August 2017: "My husband and I began to look elsewhere for natural treatment options and flew down to see Colleen Huber, NMD, Medical Director of Nature Works Best Cancer Clinic in Tempe, AZ. As soon as I met her I knew this is where I wanted to be treated. *Also, the percentages of doing treatment with Doctor Huber were better for me than with my oncologist*" (R. Stephan 2017; emphasis added).

Stephan moved her family, including her three kids, from Colorado to Arizona so that she could get weekly intravenous injections of baking soda and vitamins, a strict diet of no sugar, and supplements. Stephan claimed that after just three months of treatment, she was cancer free. She believed Huber's regimen cured her. Stephan then became the executive director for Huber's Naturopathic Cancer Society, which, in her own words, is a charitable organization "dedicated to raising funds for those who have cancer." She seemed keen to help other cancer patients afford the same naturopathic therapies as she did.

The latest update on Stephan's GoFundMe, from about a year and a half ago, reported that she was not doing well: "Friends it's with a heavy heart that I tell you Rebecca has cancer again! She is not doing well and the cancer has moved to other parts of her body! She has asked me to get as many people praying for her as we can. She is in a lot of unbearable pain and getting weaker."

It is important for cancer patients to understand the risks associated with using alternative therapies to treat cancer. The reality is that patients who use alternative therapies to treat cancer are more likely to die. There is clear scientific evidence to back this up. In 2018, Dr. Skyler Johnson and his colleagues at Yale University found that the use of alternative medicine to treat cancer is independently associated with a greater risk of death compared to conventional cancer care (Johnson et al. 2018a).

Later that same year, Johnson and colleagues published more disturbing results. They found that alternative medicine use by cancer patients was associated with refusing at least one compo-

nent of conventional cancer care, which is not surprising in my opinion, and a two-fold greater risk of death compared with cancer patients who used conventional therapies alone (Johnson et al. 2018b). This may be due to delays in conventional care or refusal of specific therapies. The bottom line is this: If you mix conventional medicine with complementary care, there may be a higher risk of death.

This evidence is all here. I have to assume that Huber is ignoring it, perhaps because she is profiting off vulnerable cancer patients. She uses her own research and statistics to set up a bubble where she can convince patients to get potentially dangerous alternative therapies.

Thanking the International Skeptical Community

This defamation lawsuit has accomplished a few important things. First, it demonstrated the strength and the unity of the international skeptic community. Eran Segev of Australian Skeptics Inc. spearheaded a fundraiser to raise the money needed to cover my legal bills. Skeptics from around the world donated, and we raised over 100,000 euros. Over 50,000 euros was donated in just the first nine days of the campaign. I will not be out any money for this lawsuit. The legal fees that I was awarded from winning the lawsuit have been deposited back into this fund. Leftover money is being held for future cases in which skeptics are being legally bullied. We hope to establish an international permanent legal fund for cases like mine, in which the plaintiff would not be able to afford to defend themselves in court.

It all looked sketchy, and truthfully Huber seemed like someone I did not want to legally tangle with. But my views were being misrepresented, and I felt like I needed to act.

Without the financial and emotional support of this community, I might have given into Huber's demands. There was no way I could afford my legal fees, which were originally estimated by my lawyer to be about 50,000 euros. What I have learned from this experience is that skeptics are not lone wolves. We are a protective, and very clever, pack. I am very lucky and very proud to be part of this family.

Second, this lawsuit exemplified the Streisand effect. Huber chose to personally attack me. In doing so, she amplified the attention on her dubious cancer research, charity, and treatments. The international press picked up the story. This lawsuit was written about, and Huber's actions were criticized all over the world.

This media attention also boosted my profile. The highlight of this attention was receiving the John Maddox Prize for my advocacy (see SI, March/April 2019). I want to especially thank Prof. Chris French and Dr. Chris Peters for nominating me for this award.

Finally, I think going through this lawsuit will help patients make informed and better choices regarding their cancer care. Hopefully Rebecca Stephan's story is a warning for other cancer patients. Since the lawsuit, Huber has edited the information presented on her charity and clinic websites. Huber now has a very stern disclosure statement on her clinic's homepage, in which she warns future patients that they may not have favorable results from her treatments.

Indeed, beware the naturopathic cancer quack. ■

Notes

1. Fellow of the American Board of Naturopathic Oncology (FABNO) is awarded by the American Board of Naturopathic Oncology (ABNO). The ABNO claims that the FABNO title is similar to board certification in oncology. To be eligible to sit for the FABNO exam, a naturopathic doctor must complete a two-year naturopathic residency in cancer care, submit medical cases for review by naturopathic examiners, and complete fifty continuing education credits approved by ABNO (Oncology Association of Naturopathic Physicians 2015). These qualifications are less stringent than those for medical doctors (American Board of Internal Medicine 2019).

2. Naturopaths commonly use IgG food allergy test panels to diagnose and treat symptoms that seem to be associated with foods. However, these tests are clinically invalid. Their use may lead to false diagnoses and unnecessary treatment (Moore 2019; Gavura 2018). To learn more, please visit the American Academy of Allergy, Asthma and Immunology webpage at www.aaaai.org.

3. *Chronic Lyme disease* (CLD) is a term commonly used to describe wide-ranging symptoms in people with various illnesses. These patients do not necessarily have clinical evidence of previous Lyme disease. The term is generally not accepted by the conventional medical community. Naturopathic practitioners frequently diagnosis CLD and treat patients using intravenous injections, ozone, supplements, and long-term antibiotics. None of these therapies is recommended to treat CLD (Baker 2010; Feder et al. 2007). To learn more, please visit the National Institute of Allergy and Infectious Diseases webpage at www.niaid.nih.gov.

4. *Adrenal fatigue* is a term used by naturopathic and alternative medicine providers to describe a condition in which the adrenal glands are over-worked and run-down and, therefore, unable to work properly, resulting in excessive fatigue. This is a common alt-med diagnosis for highly stressed individuals. Scientific evidence to support the idea of adrenal fatigue is lacking, and the conventional medical community generally does not use this terminology (Felson 2019; Shah and Greenberger 2012). To learn more, please visit WebMD's webpage on adrenal fatigue at https://www.webmd.com/a-to-z-guides/adrenal-fatigue-is-it-real#1.

References

American Board of Internal Medicine. 2019. Policies-and-Procedures (October). Available online at https://www.abim.org/~/media/ABIM%20Public/Files/pdf/publications/certification-guides/policies-and-procedures.pdf.

Arizona Naturopathic Physicians Medical Board. 2015. Dr. Michael Uzick Board Disciplinary Actions. Available online at http://directorynd.az.gov/agency/pages/directorySearchDetail.asp?holderID=102.

Association of Accredited Naturopathic Medical Colleges. 2019. Post-Graduate Naturopathic Residencies. Available online at https://aanmc.org/naturopathic-residencies/.

Baker, Phillip J. 2010. Chronic Lyme Disease: In defense of the scientific enterprise. *The FASEB Journal* 24(11): 4175–77. Available online at https://doi.org/10.1096/fj.10-167247.

Boehm, Katja, Edzard Ernst, and CAM-Cancer Consortium. 2015. Ukrain. Herbal Products. CAM-Cancer. CAM-Cancer (January 29). Available online at http://www.cam-cancer.org/The-Summaries/Herbal-products/Ukrain.

Brown, P.S. 1988. Nineteenth-century American health reformers and the

early nature cure movement in Britain. *Medical History* 32(2):174–194. Available online at https://doi.org/10.1017/S0025727300047980.
Council on Naturopathic Medical Education. 2016. 2016 CNME Handbook of Accreditation for Naturopathic Medicine Programs (April). Available online at http://www.cnme.org/resources/2016_cnme_handbook_of_accreditation.pdf.
Der Standard. 2016. Krebs-Heilmittel verkauft: 3,5 Jahre für Hersteller von 'Ukrain' (blog entry). *DER STANDARD* (May 23). Available online at https://www.derstandard.at/story/2000037504444/krebs-heilmittel-verkauft-3-5-jahre-fuer-hersteller-von-ukrain.
Ernst, Edzard, and K. Schmidt. 2005. Ukrain—a new cancer cure? A systematic review of randomised clinical trials. *BMC Cancer* 5(July): 69. Available online at https://doi.org/10.1186/1471-2407-5-69.
FDA. 2019. Actions & Enforcement. *FDA Office of Regulatory Affairs* (April 17). Available online at http://www.fda.gov/industry/import-program-food-and-drug-administration-fda/actions-enforcement.
Feder, Henry M. Jr., Barbara J.B. Johnson, Susan O'Connell, et al. 2007. A critical appraisal of 'Chronic Lyme Disease.' *New England Journal of Medicine* 357(14): 1422–30. Available online at https://doi.org/10.1056/NEJMra072023.
Felson, Sabrina. 2019. Adrenal fatigue: Is it real? (blog entry). *WebMD* (February 8). Available online at https://www.webmd.com/a-to-z-guides/adrenal-fatigue-is-it-real.
Friedman, Ronald. 2018. Importing prescription drugs remains risky business due to FDA and DEA regulation. *American Bar Association Health ESource* 14(7). Available online at https://www.americanbar.org/groups/health_law/publications/aba_health_esource/2017-2018/march2018/importing.html.
Gansauge, Frank, Marco Ramadani, Jochen Pressmar, et al. 2002. NSC-631570 (Ukrain) in the palliative treatment of pancreatic cancer. Results of a Phase II trial. *Langenbeck's Archives of Surgery* 386(8): 570–74. Available online at https://doi.org/10.1007/s00423-001-0267-5.
Gavura, Scott. 2018. IgG food intolerance tests continue to mislead consumers into unnecessary dietary restrictions (blog entry). *Science-Based Medicine* (November 15). Available online at https://sciencebasedmedicine.org/igg-food-intolerance-tests-continue-to-mislead-consumers-into-unnecessary-dietary-restrictions/.
Hermes, Britt M. 2016a. Is dubious cancer 'doctor' Colleen Huber cybersquatting my name? (blog entry). *Naturopathic Diaries* (December 1). Available online at https://www.naturopathicdiaries.com/dubious-cancer-doctor-colleen-huber-cybersquatting/.
———. 2016b. Naturopathic medicine week and the problem of endemic quackery, like ozone therapy. *Forbes* (October 13). Available online at https://www.forbes.com/sites/brittmariehermes/2016/10/13/naturopathic-medicine-week-endemic-quackery-ozone-therapy/.
———. 2017. California has a deadly problem with regulating naturopathic doctors. *Forbes* (April 17). Available online at https://www.forbes.com/sites/brittmariehermes/2017/04/24/california-has-a-deadly-problem-with-regulating-naturopathic-doctors/.
———. 2018. I need your help: Naturopath Colleen Huber is suing me (blog entry). *Naturopathic Diaries* (January 13). Available online at https://www.naturopathicdiaries.com/need-help-naturopath-colleen-huber-suing/.
Huber, Colleen. 2015. Defeating cancer requires more than one treatment method: An 8-year retrospective case series using multiple nutritional and herbal agents, 2014 update. *Journal of Cancer Science & Therapy* 7(10). Available online at https://doi.org/10.4172/1948-5956.C1.059.
———. 2016a. Natural cancer treatments (blog entry). *Nature Works Best*. Available online at http://natureworksbest.com/.
———. 2016b. Naturopathic Cancer Society (webpage screenshot). *Nature Works Best*.
———. 2017a. About us (blog entry). *Naturopathic Cancer Society*.
———. 2017b. Donate - sponsor a patient, save a life (webpage screenshot). *Nature Works Best*.
———. 2019a. Doctors (blog entry). *Naturopathic Cancer Society*. Available online at https://www.natonco.org/doc.
———. 2019b. Nature works best (blog entry). *Nature Works Best*. Available online at https://natureworksbest.com/.
Johnson, Skyler B., Henry S. Park, Cary P. Gross, et al. 2018a. Use of alternative medicine for cancer and its impact on survival. *JNCI: Journal of the National Cancer Institute* 110(1). Available online at https://doi.org/10.1093/jnci/djx145.
———. 2018b. Complementary medicine, refusal of conventional cancer therapy, and survival among patients with curable cancers. *JAMA Oncology*. Available online at https://doi.org/10.1001/jamaoncol.2018.2487.
Micozzi, Marc S. 2018. *Fundamentals of Complementary, Alternative, and Integrative Medicine - E-Book*. Elsevier Health Sciences.
Moore, Andrew. 2019. The myth of IgG food panel testing (blog entry). *The American Academy of Allergy, Asthma & Immunology.* Available online at https://www.aaaai.org/conditions-and-treatments/library/allergy-library/IgG-food-test.
Moro, Paola A., Federica Cassetti, Gianni Giugliano, et al. 2009. Hepatitis from Greater Celandine (Chelidonium Majus L.): Review of literature and report of a new case. *Journal of Ethnopharmacology* 124(2): 328–32. Available online at https://doi.org/10.1016/j.jep.2009.04.036.
Nowicky, Wassil. 2019. Ukrain (blog post). *Ukrainian Anti Cancer Institute*. Available online at https://ukrin.com/en.
Oncology Association of Naturopathic Physicians. 2015. FABNO Certification. Oncology Association of Naturopathic Physicians. Available online at https://oncanp.org/fabno-certification/.
Shah, Rachna, and Paul A. Greenberger. 2012. *Chapter 29: Unproved and Controversial Methods and Theories in Allergy-Immunology* (June). Available online at https://doi.org/info:doi/10.2500/aap.2012.33.3562.
Stephan, Charla. 2017. GoFundMe (blog entry). *Gofundme* (March 9) Available online at https://www.gofundme.com/f/3hk3tcw.
Stephan, Rebecca. 2017. Fighting cancer the natural way (blog entry). *Claire Preen's Healthy Blog* (October 27). Available online at https://web.archive.org/web/20171027121349/http:/clairepreen.com/2017/08/how-rebecca-fought-cancer-and-won-the-natural-way/.
Stickel, F., H.K. Seitz, E.G. Hahn, et al. 2001. [Liver toxicity of drugs of plant origin]. *Zeitschrift Fur Gastroenterologie* 39 (3):225–32, 234–37. Available online at https://doi.org/10.1055/s-2001-11772.
Tabish, Syed Amin. 2008. Complementary and alternative healthcare: Is it evidence-based? *International Journal of Health Sciences* 2(1): V–IX.
Thielking, Megan. 2016. 'Essentially witchcraft:' A former naturopath takes on the field (blog entry). *STAT News* (October 20). Available online at https://www.statnews.com/2016/10/20/naturopath-critic-britt-hermes/.
Ukrainian chemist lands in court for cancer 'cure.' 2015. *The Local* (January 1). Available online at http://www.thelocal.at/20150128/ukrainian-chemist-lands-in-court-for-cancer-cure.
Weeks, Carly. 2016. Are we being served by the regulation of naturopaths? Not if patients are still being misled. *The Globe and Mail* (April 28). Available online at https://www.theglobeandmail.com/life/health-and-fitness/health/canadian-naturopaths-need-to-follow-the-rules-if-they-want-regulation/article29785140/.
Whorton, James C. 2002. *Nature Cures: The History of Alternative Medicine in America*. Oxford University Press.

Britt M. Hermes is a writer, scientist, and a former naturopathic doctor. She practiced as a licensed naturopath in the United States for three years and then left the profession after realizing naturopathy is pseudoscience. Her work focuses on the deceptions naturopathic practitioners employ to scam patients and contrive legitimacy in political arenas. Hermes's writings can be found at *Forbes, Science 2.0, KevinMD*, and *Science-Based Medicine*. She spoke on this topic at CSICon 2019. She hopes her stories will protect patients from the false beliefs and bogus treatments sold by alternative medicine practitioners.

How Good Are Past Predictions of Global Warming?

Critics of climate science claim that climate models lack predictive skill. In fact, some of the earliest predictions made thirty years ago have performed remarkably well.

TOM M.L. WIGLEY

Responsible bodies such as the Intergovernmental Panel on Climate Change (IPCC) provide overwhelming scientific evidence for a dominant anthropogenic influence on climate over at least the past fifty years. However, there are still outspoken critics, from Donald Trump on down, who deny this reality. The typical criticism, rarely supported by any form of credible analysis, is this: the critics say that climate models are wrong and that, therefore, they cannot be trusted as a basis for policy. But *are* climate models wrong? Have predictions made by climate models in the past already turned out to be flawed?

This denial of the science is alarming because if we fail to take the science seriously and act too little or too slowly to ameliorate the perceived threat of future climate change, the consequences could be very serious. But there is another side to this coin: What if the magnitude of the threat has been overestimated? The uncertainties in projections of future climate change are large, and future changes could be either more or less than the central projections. The problem that policy makers are faced with, therefore, is how to act in the face of such uncertainty. Although my personal view is that it is better to err on the side of caution, treating mitigation and advance adaptation measures as insurance policies. However, the possibility of erring on the "too large a response side" is still of concern.

This issue came home to me recently while watching a video of the recent (September 21, 2019) United Nations Youth Climate Summit. Summing up after short presentations by articulate youths concerned by what they see as a lack of action by the nations of the world, the U.N. General Secretary General António Guterres unwittingly captured my concern: "The worst forecasts that were made are being proven wrong, not because they were too dramatic (but) because they were not dramatic enough in relation to reality."

What the Secretary General said is not that climate models are wrong but that even the "worst forecasts" have been *under*-estimating the magnitude of change relative to observations.

One can cherry pick the data to support the Secretary General's statement (the rapidity and magnitude of Arctic sea ice changes is a good example), but one can still ask the question, who is right? Are the critics (a.k.a. "deniers") right? Are climate models seriously flawed? Or, to put this criticism less stridently,

Are climate models wrong? Have predictions made by climate models in the past already turned out to be flawed?

are models *in general* grossly overestimating changes? Or is the Secretary General right that models are underestimating changes?

I will attempt to at least throw some light on this issue, but before I do some history is relevant. The idea that there might be significant anthropogenic global warming in the future goes back into the nineteenth century, and there are excellent works that document this early history, such as the book *The Discovery of Global Warming* by Spencer Weart (2008). A milestone in the development of the science, however, came in 1979 with what is referred to as the "Charney Report" (U.S. National Research Council 1979). This was the first attempt to review the state of the science on the global warming problem, put together by some of the leading climate experts of the day. Surprisingly, as a recent *Conversation* article has reminded us (Nicholls 2019), some of the key statements in this report were almost prescient in their accuracy.

My personal view is that it is better to err on the side of caution, treating mitigation and advance adaptation measures as insurance policies.

The Charney Report was published soon after the first three-dimensional, global, spatially specific (i.e., "gridded") climate models had been developed, beginning with the work of Syukuro Manabe and Richard Wetherald (1975) at the National Oceanic and Atmospheric Administration's (NOAA) Geophysical Fluid Dynamics Laboratory in Princeton, New Jersey. These atmospheric General Circulation Models (GCMs) were relatively rudimentary compared with those being used today, but they still required state-of-the-art computing power to run. A serious limitation was that they used extremely simple realizations of the ocean with no dynamics and so were unable to give any information about the possible time evolution of climate. The next generation of such models, with more realistic three-dimensional oceans coupled to an atmospheric GCM, are referred to as coupled Ocean-Atmosphere GCMs (OAGCMs). Although there are earlier examples, the earliest application of an OAGCM to the problem of increasing CO_2 levels was in 1982 (Bryan et al. 1982).

Observations of the climate were equally rudimentary. There were very few satellite data, so spatial coverage was restricted to information from weather stations, leaving large data gaps, particularly over the oceans. It was not until 1986 that the first estimates of true global-average temperature changes (i.e., covering both the land and ocean areas) were made (Jones et al. 1986), thanks to painstaking work compiling and correcting collections of observations from ships at sea made by researchers working independently in the United Kingdom and the United States. It was only then that we had the possibility—in principle at least—of comparing model predictions of changes in global-mean temperature with observed changes.

But even here we were thwarted. The most sophisticated models, such as the Bryan et al. model noted above, were not yet able to consider the full suite of species that could influence the climate and so could not make useful comparisons between modeled and observed change. Ideally we would like to compare the three-dimensional patterns of change in several observed climate variables with results from models driven by realistic projections of the emissions of all the important climate forcing agents. This would provide a very stringent test of models, but in the 1980s we were still a decade away from being able to make comparisons of this type (Santer et al. 1996).

The first credible projections of future climate were made by Jim Hansen and colleagues at NASA's Goddard Institute for Space Studies (GISS) (Hansen et al. 1988). This seminal paper used the GISS atmospheric GCM coupled to what was still a relatively simple ocean model. The key difference from most other GCM studies of the time was that it accounted for heat transport below the ocean's mixed layer and so could quantify oceanic lag effects. Hansen and his colleagues drove their model with estimates of projected changes in atmospheric composition (rather than emissions)—most importantly, concentrations of carbon dioxide and methane. I discuss results from their simulations below.

In parallel with this work, other simpler (but still physically realistic) models were being developed and explored: energy-balance models (EBMs). To project future climate changes, these models still had to account for oceanic thermal inertia, which they did by modeling oceanic heat transfer as an upwelling-diffusion process. The relevant models are called Upwelling-Diffusion EBMs (UD EBMs). (*Upwelling-Diffusion* here refers to the mathematical technique used to quantify the vertical flux of heat into and through the ocean.) The oceans are the key to getting realistic estimates of future climate change, because their massive heat sinks slow down the response of the climate system to any form of external forcing. These external forces might be, for example, the effect on climate of changes in greenhouse gas concentrations (our primary concern), changes in the energy output of the Sun, the effect of large volcanic eruptions (possible obfuscating effects), and so on. These models cannot project the three-dimensional details of climate change; their primary output is that for changes in global-mean temperature (GMT).

Even with physically credible climate models, it is still a challenge to predict the future, because we also need to predict how the emissions of greenhouse gases and other climate forcing agents are going to evolve. As I have noted, the Hansen et al. study bypassed the emissions in favor of estimated changes in concentrations directly, whereas UD EBMs generally add, up front, so-called "gas cycle" models that convert emissions to concentrations and allow the models to be driven by emissions projections.

By the late 1980s, we had two methods available to estimate future climate change in great detail: using models such as that of Hansen et al. and, for global-mean temperatures only, using

UD EBMS. In addition, we had good estimates of how global temperatures had changed in the real world since the late nineteenth century. The stage was set for testing models against observations, but we still had to wait for the future to catch up to the model projections.

So here we are, thirty years on, with the time ripe to see how well these early projections have performed. In the following, I will give results for five of the earliest projections of changes in global-mean temperatures, made in 1988, 1989, 1990, and 1992, summarized below in Table 1.

As an example of the early work with UD EBMs, in 1989 I was asked by U.K. Prime Minister Margaret Thatcher to give a presentation on the state of climate science to her and her cabinet (U.K. Dept. of the Environment 1989). In my presentation to the Thatcher cabinet, I used a UD EBM called STUGE (Wigley et al. 1991) developed in collaboration with Sarah Raper when we were colleagues in the Climatic Research Unit at the University of East Anglia, and I gave estimates of future GMT changes from 1985 out to 2040, taking into account likely changes in the emissions of the main greenhouse gases (CO_2, CH_4, N_2O, and a large number of halocarbons). In these estimates of global-mean temperatures, the only drivers of climate change were future greenhouse gas emissions. At about this time we already realized that future changes in climate would be caused not only by greenhouse gases but also by "aerosols," small particles or droplets that reflect incoming solar radiation and change the radiative properties of clouds to cause a cooling effect that would, to some uncertain degree, offset the warming induced by greenhouse gases.

This neglect of aerosol effects was a serious shortcoming, because the main source of CO_2, coal burning, produces not only emissions of CO_2 but also emissions of sulfur dioxide (SO_2). When oxidized and combined with water vapor, SO_2 emissions lead to a build-up of sulfate (mainly sulfuric acid) aerosols in the atmosphere. These aerosols could potentially have a substantial cooling effect if SO_2 emissions increased or, conversely, a warming effect if emissions decreased. While this was well known at the time, the magnitude of this aerosol effect was still highly uncertain, as it still is today (Wigley and Santer 2013); hence, their neglect.

The 1989 global-mean temperature projections are shown in Figure 1, where they are compared with observations. While the projections used estimates of future greenhouse gas emissions, uncertainties in the magnitude of these emissions was recognized as a major source of uncertainty in future GMT estimates. We now know that the greenhouse gas emissions projections made then were generally too high, so the projected future concentration projections, particularly for CO_2 and CH_4 (see Table 1), were also too high. This alone would lead to any warming projections to also be overestimated.

This is indeed the case, as shown in Figure 1 (from U.K. Dept. of the Environment 1989) and Table 1. The Figure shows two projections for temperature, labeled LOW and HIGH, with the LOW–HIGH range being an attempt to account for a range of uncertainties in both future greenhouse gas emissions and the structure of the climate model. For the latter, the main uncertainties were (and still are) in the climate "sensitivity" (characterized by the amount of global-mean warming that would eventually occur if the atmospheric concentration of CO_2 were doubled) and the rate at which the heat from this warming was transferred from the atmosphere into the ocean. We assumed a climate sensitivity of 2.5°C, close to the current

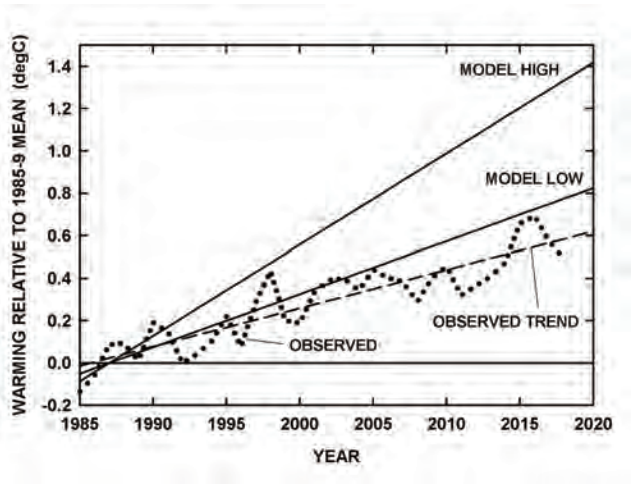


Figure 1: LOW and HIGH predictions of global-mean warming from UKDOE (1989), full lines, compared with observations from the HadCRUT4 data set, dots. The model projected changes are indistinguishable from linear. The linear trend line for the observations is also shown, dashed. Changes are relative to the 1985 through 1989 mean.

	Hansen 1988	Wigley 1989	IPCC 1990	IPCC 1992	WR 1992
Observed rate	0.18	0.18	0.17	0.17	0.17
Model best	0.27	0.32	0.27	0.26	0.18
Model range	0.15 to 0.32	0.25 to 0.43	Not stated	0.18 to 0.40	0.13 to 0.26
2018 CO_2 conc.	404 (407)	419 (407)	421 (407)	431 (407)	419 (407)
2018 CH_4 conc.	2314 (1857)	2132 (1857)	2407 (1857)	2009 (1857)	Not stated
Start year	1985	1985	1990	1990	1990

Table 1: Summary of results from early projections of global-mean temperature (GMT) change (warming rate). The first three rows give the rate of temperature change (C/decade) from the stated start year (final row) through 2018. The additional rows give the predicted 2018 concentrations of CO_2 and CH_4, with the observed values in parenthesis. WR stands for Wigley and Raper. Observed temperature trends from HadCRUT4; concentrations from NOAA ESRL.

best estimate. Our overestimate of future emissions meant that our projections of future warming were too high, even for the LOW projection, as is clear from Figure 1.

Similar projections to those in Figure 1, made with the same climate model, were also given in Annexes to the 1990 and 1992 IPCC reports (Jenkins and Derwent 1990; Mitchell and Gregory 1992), but they used different future projections of greenhouse gas emissions. Mitchell and Gregory used emissions scenarios from a new and more comprehensive assessment of future emissions, produced under the auspices of IPCC, referred to as the IS92 scenarios (Pepper et al. 1992).

As shown in Table 1, for four of the five cases considered here, the projected 2018 concentrations for CO_2 and CH_4 were higher than those eventually observed. The exception is the CO_2 projection derived here from information in Hansen et al., which is remarkably close to what has been observed. However, the consequent projected warming rate, 0.27°C/decade, is much higher than observed. This is in part because of overestimates of changes in the concentrations of other greenhouse gases (see the result for methane in Table 1), but also because the Hansen et al. model had quite a high climate sensitivity (4.2°C).

At this time, understanding of aerosol effects on climate was advancing rapidly. Through these developments, Sarah Raper and I were able to incorporate the effects of sulfate aerosol forcing into the most recent version of our climate model (an improvement on STUGE called MAGICC; Meinshausen et al. 2011) and produce, for the first time, projections of global-mean temperatures that allowed for sulfate aerosol changes (Wigley and Raper 1992). As in the 1992 IPCC report, we also used the IS92 emissions scenarios, which included projections for SO_2 emissions. Temperature projection results from this paper are shown in Figure 2.

The model-observed agreement in Figure 2 looks remarkable, but this agreement is partly the result of compensating errors. In the early 1990s, the available history of SO_2 emissions showed a steady long-term increase, and projections into the twenty-first century assumed this increase to continue. The

Some of the key statements in the "Charney Report" were almost prescient in their accuracy.

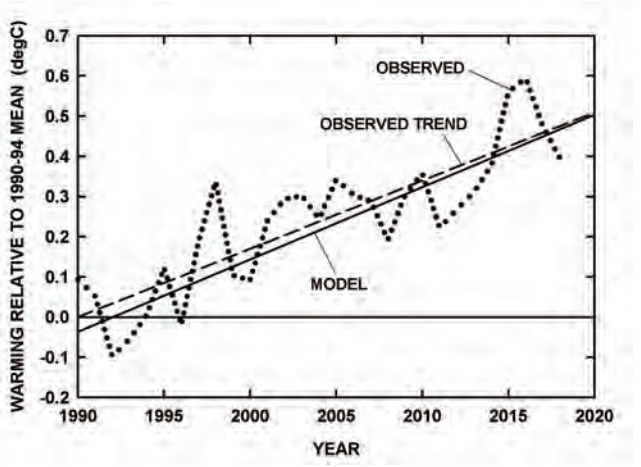


Figure 2: Best-estimate projected global-mean warming from Wigley and Raper (1992, Fig. 5), full line, compared with observations from the HadCRUT4 data set, dots. The model projected changes are indistinguishable from linear. The linear trend line for the observations is also shown, dashed. Changes are relative to the 1990 through 1994 mean.

effect of these changes was to cause a cooling in the model, offsetting and largely compensating for the warming error arising from overestimates of future greenhouse gas emissions. We now know, however, that SO_2 emissions *decreased* after the 1980s (Klimont et al. 2013), leading to a warming rather than a cooling. So was the agreement in Figure 2 perhaps simply fortuitous?

Emissions uncertainties are clearly an important source of uncertainty in projections of GMT. This was the case back in 1989 and remains so today. But in the case of the 1992 simulations, the issue is more complicated. If we were to re-run these calculations now with the correct (i.e., observed) emissions, what would happen? First, the reduced greenhouse gas emissions would lead to reduced warming in the model. And, second, the reduced SO_2 emissions (and reduced aerosol loading in the atmosphere) would lead to warming in the model. The corrections act in opposite directions, so the net effect on the global-mean temperature projections would be small, and, even with the corrected emissions, there would still be a good correspondence between the model results and observations. The "flaw" of compensating errors in the Figure 2 results noted above is actually a red herring.

Nevertheless, there is a range of uncertainties that still bedevil attempts to quantify future climate change and to compare model projections with observations. Emissions uncertainties are still important for making future projections. Otherwise, the most important uncertainties are in the climate sensitivity, where the uncertainty range is about a factor of three with a central estimate of around 3.0°C, and the magnitude of aerosol forcing, where the uncertainty range is around a factor of two. These uncertainties have not been reduced significantly over the past few decades.

The stage was set for testing models against observations, but we still had to wait for the future to catch up to the model projections.

These results from thirty years ago, peering with the model's eyes into the future that is today, show that even then our understanding of climate change was robust enough to make predictions that were remarkably accurate. While UD EBMs still have a role to play, the three-dimensional atmospheric global circulation models of the 1980s have been replaced by models that include the full dynamical and thermodynamic properties of the oceans, coupled interactively to the atmosphere, the cryosphere, and the biosphere, now referred to as "Earth System Models." Observational data sets have ballooned to encompass many different variables and improved in terms of spatial coverage and accuracy. And dozens, perhaps hundreds, of new tests have been carried out to confirm the reliability of these models.

The good news is that when properly assessed, projections made some thirty years ago have stood the test of time; the bad news is that in terms of action, we are still only scratching the surface of the responses needed to prevent, to quote from the 1992 United Nations Framework Convention on Climate Change, "dangerous anthropogenic interference with the climate system." The real challenges still lie ahead. ■

References

Bryan, K., F.G. Komro, S. Manabe, et al. 1982. Transient climate response to increasing atmospheric carbon dioxide. *Science* 215: 56–58.

Hansen, J., I. Fung, A. Lacis, et al. 1988. Global climate changes as forecast by the Goddard Institute for Space Studies three-dimensional model. *Journal of Geophysical Research* 93: D8, 9341–9364.

Jenkins, J.G., and R.G. Derwent. 1990. Climatic consequences of emissions. Annex to *Climate Change: The IPCC Scientific Assessment* (J.T. Houghton, G.J. Jenkins, and J.J. Ephraums, eds.). Cambridge University Press, 329–339.

Jones, P.D., T.M.L. Wigley, and P.B. Wright. 1986. Global temperature variations between 1861 and 1984. *Nature* 322: 430–434.

Klimont, Z., S.J. Smith, and J. Cofala. 2013. The last decade of global anthropogenic sulfur dioxide: 2000–2011 emissions. *Environmental Research Letters* 8(014003): 1–6.

Manabe, S., and R.T. Wetherald. 1975. The effects of doubling the CO_2 concentration on the climate of a General Circulation Model. *Journal of the Atmospheric Sciences* 32: 3–15.

Meinshausen, M., S.C.B. Raper, and T.M.L. Wigley. 2011. Emulating coupled atmosphere-ocean and carbon cycle models with a simpler model, MAGICC6 – Part I: Model description and calibration. *Atmospheric and Chemical Physics* 11: 1417–1456.

Mitchell, J.F.B., and J.M. Gregory. 1992. Climatic consequences of emissions and a comparison of IS92a and SA90. Annex to *Climate Change 1992: The Supplementary Report to The IPCC Scientific Assessment* (J.T. Houghton, B.A. Callander, and S.K. Varney, eds.), Cambridge University Press, 171–175.

Nicholls, N. 2019. 40 years ago, scientists predicted climate change, and hey, they were right. *The Conversation* (July).

Pepper, W.J., J.A. Leggett, R.J. Swart, et al. 1992. *Emission Scenarios for the IPCC—an update: Background Documentation on Assumptions, Methodology and Results*. U.S. EPA, Washington, D.C.

Santer, B.D., K.E. Taylor, T.M.L. Wigley, et al. 1996. A search for human influences on the thermal structure of the atmosphere. *Nature* 382: 39–46.

U.K. Dept. of the Environment. 1989. *Seminar on Climate Change*. My lecture was titled "Scientific Assessment of Climate Change and its Impacts."

U.S. National Research Council. 1979. *Carbon Dioxide and Climate: A Scientific Assessment*: National Academies Press, Washington, D.C.

Weart, Spencer R. 2008. *The Discovery of Global Warming: Revised and Expanded Edition*. Harvard University Press.

Wigley, T.M.L., and S.C.B. Raper. 1992. Implications for climate and sea level of revised IPCC emissions scenarios. *Nature* 357: 293–300.

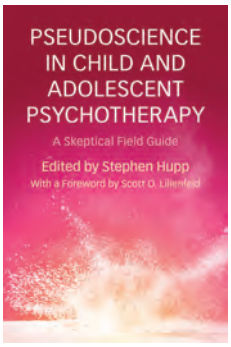
Wigley, T.M.L., and B.D. Santer. 2013. A probabilistic quantification of the anthropogenic component of 20th century global warming. *Climate Dynamics* 40: 1087–1102.

Wigley, T.M.L., T. Holt, and S.C.B. Raper. 1991. *STUGE (An Interactive Greenhouse Model): User's Manual*. Norwich, U.K.: Climatic Research Unit.

Tom M.L. Wigley is a highly cited climate scientist, a contributor to IPCC reports on many occasions, and a former director of the U.K. Climatic Research Unit. He was recently named one of the world's top ten climate change scientists. He is at the University of Adelaide, South Australia, and the National Center for Atmospheric Research, Boulder, Colorado.

Dubious Claims in Psychotherapy for Youth

Part II: Internalizing Issues



This is the second article in a three-part series about questionable ideas in child and adolescent psychotherapy. Topics in this installment relate to internalizing issues in youth and include naturopathic medicine for mania, dream interpretation for depression, fears about Bigfoot, superstitious rituals for anxiety, attachment parenting, and homeopathy for psychosis.

STEPHEN HUPP, BRITT M. HERMES, CALEB W. LACK, CAROL E. COLANINNO, STUART VYSE, AMY TUTEUR, AND MICHAEL MARSHALL[1]

This is the second installment of a three-part series that shares the sidebars from the book *Pseudoscience in Child and Adolescent Psychotherapy* (edited by Stephen Hupp, Cambridge University Press, 2019). Contributors for this installment include a former naturopathic doctor, a clinical psychologist, an anthropologist, a behavioral scientist, an obstetrician gynecologist, and an investigator and conference organizer. Topics covered include symptoms related to psychosis, the bipolar spectrum, depression, phobias, obsessive compulsive disorder, and attachment.

Mania: Does Naturopathic Medicine Help Treat Bipolar Disorder?

Britt M. Hermes

Naturopathic doctors (NDs) are complementary and alternative medicine (CAM) practitioners who claim they are trained similarly to physicians. It's critical to understand the education and philosophy behind naturopathy, as patients of any kind are likely to encounter NDs.

NDs believe the body has a mystical energy force called the *vis* that can be harnessed to heal through magical options. NDs passionately advertise that their therapies work, but no naturopathic treatment has been clinically proven to be safe and effective for bipolar disorder or any other condition. NDs attend four-year programs in which students take abbreviated versions of medical courses and study a plethora of CAM practices that include homeopathy, acupuncture, high-dose vitamins, and "functional medicine," the pseudoscientific use of excessive laboratory tests to prescribe supplements. The ND curriculum relies on the trappings of science and is accredited by a naturopathic council.

Naturopathic doctors believe the body has a mystical energy force called the vis that can be harnessed to heal through magical options.

NDs can become licensed to practice in twenty U.S. states and Washington, D.C., and are regulated by naturopathic boards. NDs have lobbied aggressively for these markers of legitimacy and have been successful by exploiting the public's scientific illiteracy and proclivity for natural solutions. Lay naturopaths, on the other hand, do not attend accredited programs and are not regulated. The two professions, however, share the same health philosophy and use the same methods. Because NDs attach "doctor" to their name, patients perceive them as medically competent practitioners capable of diagnosing and treating disease. This misperception makes NDs uniquely dangerous (for more information see Hermes 2015a; Hermes 2015b).

Depression: Is Psychoanalytic Dream Interpretation Useful?

Caleb W. Lack

People have attempted to make sense of dreams for the entirety of recorded history, from the Sumerian *Epic of Gilgamesh* to Freud's *Die Traumdeutung*. But is there anything to dream analysis? Most modern dream analysis flows from the psychoanalytic ideas of Freud, which posit that the content of dreams, if properly understood, can allow us to understand the true roots of our mental health problems. This insight would then lead us to become more mentally healthy. In particular, Freud believed that dreams were wish fulfillments and that what happened in them was the true expression of (often repressed) desires. However, modern research has poked huge holes in Freud's assumptions and the overall idea of the usefulness of dream interpretation.

Modern research has poked huge holes in Freud's assumptions and the overall idea of the usefulness of dream interpretation.

First, most of our dreams don't have hidden, secret meanings but instead are about our daily lives. While there are certainly oddities that occur in REM dreams in particular, even those can often be traced back to what you were talking about, seeing, reading, or playing on a given day. Second, most emotionally charged dreams are negative rather than being positive or enjoyable. For instance, less than 10 percent of our dreams involve sexual activity, which Freud considered the most common type of desire that would manifest in dreams. Third, given well-understood problems with human memory and recall, it's quite likely that most of the dreams we can remember bear only a passing resemblance to the actual dream we experienced. How accurate could an interpretation of such even be?

Finally, and of the most relevance to most readers here, there is no evidence at all that understanding or interpreting dreams has a positive impact on one's mental health. Assessing sleep length and quality is crucial for the child clinician, but dwelling on dream content or searching for hidden meanings only wastes everyone's time. For an in depth critique, see Domhoff 2000.

Anxiety: Should Children Be Afraid of Bigfoot?

Carol E. Colaninno

Throughout history, children have feared many types of monsters, often thought to be hiding under the bed, in the deep, dark forest, or in murky, muddy waters. The fear of monsters can have profound impacts on children and even adults. One "monster" receiving recent publicity and causing both children and their parents to fear the forest is Bigfoot. The pursuit of documenting the existence of this hairy, human-like giant with big feet is the subject of headlines, blogs, and even television series and documentaries. But does the scientific community have evidence for children to be wary? The short answer is: well, not really. There is little empirical evidence to support claims that Bigfoot exists. The evidence we do have suggests our imaginations have morphed creatures of the past and present into a harmless, mythical monster.

In the very recent past before human civilization, creatures that resembled Bigfoot existed. Known as *Gigantopithecus*, this now-extinct genus of apes, most closely related to present-day orangutans, is estimated to have stood nine feet tall and weighed over 1,000 pounds (Ciochon 1991). This giant primate roamed the forests of present-day China, India, and Vietnam. *Gigantopithecus* did coexist with our human-like ancestors, *Homo erectus* (Ciochon et al. 1996), but even then, our ancestors had little reason to fear them. Scientists studying the fossilized teeth of *Gigantopithecus* have concluded that members of this genus ate fibrous vegetation, mostly bamboo with some seeds and fruit (Ciochon 1991), not children! It is also safe to say that *Gigantopithecus* went extinct during the last ice age (Pleistocene) when many very large mammals suffered mass extinction due to global climate change.

So, millions and thousands of years ago, there was an animal that was Bigfoot-like, but there is no evidence that any similar creature roams the earth today. Under the frame-

work of the scientific method, we are able to disprove those explanations not consistent with evidence. As great as this method is, we cannot disprove the existence of something we have no evidence for, in this case, Bigfoot. We can merely say that there is no evidence to support its existence. Although many have used this limitation of the scientific method to profit off the search for this mythical monster, the scientific community can safely say there is no evidence to support fears of Bigfoot.

Obsessions and Compulsions: Do Superstitious Rituals Help Cope with Anxiety?

Stuart Vyse

If you were a school-aged child in England of the 1930s and you saw an ambulance go by, you would likely grab your collar and quickly recite:

> Touch your collar, Touch your toes.
> Never go in one of those.
> Touch your knee, Touch your chin
> Never let the burglar in.

The rhyme might vary depending upon your area of the country, and in some cases the ritual required that you maintain a grip on your collar until you had seen a dog or another four-legged animal (Opie and Opie 1959). In England during that era, children spent more time outside than they do today, and there were lucky or unlucky omens associated with seeing nuns, trains, oil patches, people with wooden legs, and a variety of animals, including white horses, crows, ladybirds, and magpies.

There is little understanding of the relationship, if any, between typical childhood rituals and the more pathological patterns of behavior shown in OCD.

Many typically developing children show magical beliefs and rituals beginning at approximately the age of two and continuing throughout childhood (Evans et al. 2002). Often these rituals center around common early fears, and although they appear similar in shape to the compulsive rituals of Obsessive Compulsive Disorder (OCD), there is little understanding of the relationship, if any, between typical childhood rituals and the more pathological patterns of behavior shown in OCD (Evans et al. 1997). Indeed, early superstitious rituals are considered adaptive responses to anxiety, in contrast to the nonfunctional compulsions of OCD. Furthermore, many adults employ rituals to manage the stress of loss and to prepare for important performances (e.g., in sports and the theater), and there is now growing evidence that rituals can help adults manage anxiety, which in turn can improve performance at a skilled activity (e.g., a timed math test; Brooks et al. 2016). Rituals are not magical incantations, but, in both children and adults, performing a ritual can have psychological benefits. However, it's important to note that the ritual can be helpful even without any attached superstition (for a more detailed discussion, see Vyse 2018).

Trauma and Attachment: Does Attachment Parenting Promote Attachment?

Amy Tuteur

Attachment parenting is the dominant parenting ideology of early twenty-first-century America, yet it has no basis in science. It contains the word *attachment*, yet its fundamental principle is at odds with attachment theory. It claims to recapitulate successful parenting in prehistory, yet prehistory was populated by multiple different parenting cultures that changed over many centuries. Simply put, it's a philosophical viewpoint masquerading as science.

Attachment parenting was created from whole cloth by William and Martha Sears, a pediatrician and nurse, respectively. The fundamental principle of attachment parenting, never clearly articulated, is that mother-infant attachment is problematic and uncertain, contingent on specific mothering behaviors, including unmedicated childbirth, extended breastfeeding, and, above all, continuous physical proximity between mother and child (Sears and Sears 1997). This is precisely opposite of the insights of John Bowlby (Bretherton 1992), H.F. Harlow (1958), and other founders of attachment theory. They discovered that attachment occurs spontaneously between caregivers and babies so long as the caregivers can be depended upon to reliably respond to the infants' most important physical and emotional needs. While attachment theory tells us that children only need a "good enough" mother (Winnicott 1971), attachment parenting insists that children need a perfectly giving, always available mother.

Attachment parenting reflects a longing for the past—but it's a past that never existed.

Psychosis: Is Homeopathy Effective for Schizophrenia?

Michael Marshall

Homeopathy is promoted for all manner of ailments, including physical conditions ranging from hay fever to cancer. Its promotion for psychological issues is equally broad-ranging—with homeopaths promoting their treatment for most mental health issues, including schizophrenia (Fountainhead Clinic N.d.).

The breadth of therapeutic indications claimed by homeopaths runs contrary to the strength of its evidence base. While it is hard to find a single condition not treated by one homeopath or another, it's equally hard to find any credible and replicable evidence that the treatment is effective. In fact, based on a review of the research, the National Health and Medical Research Council (NHMRC) in Australia concluded that "there are no health conditions for which there is reliable evidence that homeopathy is effective" (NHMRC 2015, 1).

The reason for this inefficacy lies in a central tenet of homeopathy, "The Law of Infinitesimals." Homeopathy is based on the misguided principle that liquid or powdered solutions get stronger the more they are diluted, with the strongest remedies diluted far past the point where any trace of the original active ingredient can still be found, even with the most accurate measuring equipment. As such, most homeopathic remedies contain nothing but water (see The 10:23 Campaign N.d.) and the sugar that makes up the blank pill. It is therefore no surprise when a chemically inert pill fails to be effective for any condition. ■

Note

1. The authors are listed in the order that their work appears in the book. Authors were only involved in their own sidebar and were not involved in writing or editing the other sidebars.

References

Bretherton, I. 1992. The origins of attachment theory: John Bowlby and Mary Ainsworth. *Developmental Psychology* 28(5): 759–775.

Brooks, A.W., J. Schroeder, J.L. Risen, et al. 2016. Don't stop believing: Rituals improve performance by decreasing anxiety. *Organizational Behavior and Human Decision Processes* 137: 71–85.

Ciochon, R.L. 1991. The ape that was. *Natural History* 100(11): 54.

Ciochon, R., V.T. Long, R. Larick, et al. 1996. Dated co-occurrence of Homo erectus and Gigantopithecus from Tham Khuyen care, Vietnam. *Proceedings of the National Academy of Sciences* 93(7): 3016–3020.

Domhoff, G.W. 2000. *Moving Dream Theory Beyond Freud and Jung.* Paper presented to the symposium "Beyond Freud and Jung?," Graduate Theological Union, Berkeley, CA, September 23.

Evans, D.W., M.E. Milanak, B. Medeiros, et al. 2002. Magical beliefs and rituals in young children. *Child Psychiatry and Human Development* 33(1): 43–58.

Evans, D.W., J.F. Leckman, E. Carter, et al. 1997. Ritual, habit, and perfectionism: The prevalence and development of compulsive-like behavior in normal young children. *Child Development* 68(1): 58–68.

Fountainhead Clinic. N.d. Naturopathic treatment of schizophrenia. Available online at http://fountainheadclinic.com/schizophrenia/.

Harlow, H. F. 1958. The nature of love. *American Psychologist* 13(12): 673–685.

Hermes, B. 2015a. ND Confession, Part I: Clinical training inside and out. Available online at https://sciencebasedmedicine.org/nd-confession-part-1-clinical-training-inside-and-out/.

———. 2015b ND Confession, Part II: The accreditation of naturopathic "medical" education. Available online at https://sciencebasedmedicine.org/nd-confession-part-ii-the-accreditation-of-naturopathic-medical-education/.

National Health and Medical Research Council. 2015. Statement on homeopathy. Available online at https://www.nhmrc.gov.au/about-us/publications/homeopathy.

Opie, I., and P. Opie. 1959. *The Language and Lore of School Children.* Oxford: Oxford University Press.

Sears, W., and M. Sears. 1997. *The Complete Book of Christian Parenting and Child Care: A Medical and Moral Guide to Raising Happy Healthy Children.* Nashville: B& H Books.

The 10:23 Campaign. N.d. What is homeopathy? Available online at http://www.1023.org.uk/what-is-homeopathy.php.

Vyse, S. 2018. Do superstitious rituals work? Skeptical Inquirer 42(2): 32–34.

Winnicott, D.W. 1971. *The Child, the Family and the Outside World.* Harmondsworth: Penguin Books.

Authors

Stephen Hupp, PhD, is a psychology professor at Southern Illinois University Edwardsville. He is the coauthor of the books *Great Myths of Child Development, Great Myths of Adolescence, and Thinking Critically about Child Development*—4th Edition. On Twitter he is @StephenHupp.

Carol E. Colaninno, PhD, is an anthropologist specializing in archeology and assistant research professor for the STEM Center at Southern Illinois University Edwardsville.

Britt M. Hermes, MSc, doctoral student, writes about her former life as a naturopathic doctor and the risks of CAM at NaturopathicDiaries.com. On Twitter she is @NaturoDiaries.

Caleb W. Lack, PhD, is a professor of psychology at the University of Central Oklahoma. Among other works, he is coauthor of the book *Critical Thinking, Science, and Pseudoscience: Why We Can't Trust Our Brains* (2016). On Twitter he is @professorlack.

Michael Marshall, BA, is the project director of the Good Thinking Society. He is also one of the organizers of the QED: Question, Explore, Discover conference in England. On Twitter he is @MrMMarsh.

Amy Tuteur, MD, is an obstetrician gynecologist. She is author of the book *Push Back: Guilt in the Age of Natural Parenting* (2016). She is @ATuteur on Twitter.

Stuart Vyse, PhD, is a behavioral scientist and contributing editor for Skeptical Inquirer magazine. He is the author of the books *Believing in Magic: The Psychology of Superstition, Updated Edition* (2013) and *Superstition: A Very Short Introduction* (2020). On Twitter he is @stuartvyse.

General Nathan F. Twining and the Flying Disc Problem of 1947

In 1947, the United States was dealing with reports of flying discs in its airspace. Were they a secret U.S. program or of foreign origin? General Nathan F. Twining signed a letter confirming the existence of the discs but admitted to not knowing their origin. Did the discs ever really exist?

ERIC WOJCIECHOWSKI

On September 23, 1947, an extraordinary letter titled "AMC Opinion Concerning 'Flying Discs'" was signed by Lieutenant General Nathan F. Twining of the United States Air Material Command (AMC) and sent to Air Force Brigadier General George Schulgen per his request to understand what was going on regarding reports of "flying discs." The extraordinary part was the conclusion that the flying discs were "something real and not visionary or fictitious."

At the time, the United States was being inundated with reports of unidentified aircraft or flying saucers. World War II had recently ended, a Cold War was ramping up, and the world's remaining powers were quickly developing new technologies to overtake one another (particularly the United States and Russia). As a result, when reports of unidentified strange aircraft were coming in, the U.S. military had to ensure a foreign threat wasn't present.

In early July 1947, the Army Air Force Intelligence Collections Division, located in the Pentagon, began an investigation with Lieutenant George Garrett assigned to lead the gathering of information. After collecting several UFO reports, Lt. Garrett, with assistance from FBI liaison S.W. Reynolds, prepared an estimate document of the situation wherein they concluded that patterns in the sightings suggested real aircraft and questioned whether the UFOs were secret technology of the United States itself. The estimate was signed off by Lt. Garrett's superior, Chief Collection Branch Colonel Robert Taylor III, and passed on to other military heads to inquire on the elusive disc's origins.

On September 23, 1947, Lieutenant General Twining signed off on the AMC response to the inquiry, the "AMC Opinion Concerning 'Flying Discs,'" which read, in part:

> a. The phenomenon is something real and not visionary or fictitious.
>
> b. There are objects probably approximating the shape of a disc, of such appreciable size as to appear to be as large as man-made aircraft.
>
> c. There is a possibility that some of the incidents may be caused by natural phenomena, such as meteors.
>
> d. The reported operating characteristics such as extreme rates of climb, maneuverability (particularly in roll), and motion which must be considered evasive when sighted or contacted by friendly aircraft and radar, lend belief to the possibility that some of the objects are controlled either manually, automatically or remotely.

General Nathan F. Twining

The language is very much like Garrett's original inquiry letter, suggesting Twining and his team simply cut and pasted the sections showing agreement. Following this section are some "common descriptions" of the objects: being "circular or elliptical," some flying in formations of more than one, and other commonalities. The AMC Opinion finishes with questions pondering the origin of these craft: Were they a secret U.S. project or possibly from a foreign nation?

In its closing, the AMC Opinion recommends "a detailed study of this matter to include the preparation of complete sets of all available and pertinent data."

In the aftermath of this letter, a detailed study was set up called Project Sign. Said project folded in 1949 after preparing a final report that was inconclusive. It stated that the sightings were probably of actual aircraft but the origins were unknown. The possibility of their being domestic (and if not, foreign) was offered, but, in general, it was concluded something real was in the air, and it was suggested further study as to what they were, where they were coming from, and what kind of threat (if any) they posed was needed.

At this point an extraterrestrial hypothesis was still on the table, although it was frowned upon and eventually discarded. A new study, Project Grudge, replaced Sign and then morphed into Project Blue Book. In 1969, the Condon Committee once and for all closed the official, public, government-run study of UFOs, and Project Blue Book was terminated.

On October 1, 1947, within a week of signing off on the AMC Opinion, Twining went from his position as Lieutenant General of the AMC to commanding general of the Alaskan Department. After several more subsequent placements, on August 15, 1957, Twining ended up the chairman of the Joint Chiefs of Staff, where he served until retirement.

The question remains: Did Twining ever get an answer on the origin of the UFOs so convincingly accepted as real in the 1947 AMC Opinion letter?

After Twining retired in 1960, he set about writing *Neither Liberty Nor Safety: A Hard Look at U.S. Military Policy and Strategy*. The book, published in 1966, gives details on what he saw that threatened the United States, how it came to be, and where he thought military strategy and policy should go. Surely if Twining still considered flying discs a reality (and a threat), it's logical to suspect we'd see something in this book.

A Secret U.S. Flying Saucer Program?

Twining wrote that in the late 1940s there was a rivalry between the Air Force and Navy over appropriations. As a result, Congress got involved in 1949 and decided the Air Force would have priority in receiving funding for the new B-36 bomber. The Congressional report reads, in part, "It is the unanimous judgment of the committee that the B-36 bomber was selected and procured regularly, based on an honest conviction that *it is the best available aircraft for its purpose in the defense of the United States today*" (emphasis added). And after noting that no "collusion, fraud, corruption, influence or favoritism played any part whatsoever in the procurement of the B-36 bomber," the report continues, "There has been very substantial and compelling evidence that the Air Force selected and procured this bomber solely on the ground that *this is the best aircraft for its purpose available to the nation today*" (emphasis added).

If the U.S. military had amazing flying saucers back then, this statement makes no sense.

Twining remarked that in 1950, the United States announced the atomic bomb would not be used during the Korean War. This announcement was followed by communist response of a "major attack on all fronts." Twining wrote, "It is possible that this national decision not to use *our best weapons*, and our concomitant decision to so advise the masters of Red China, changed the course of history in Southeast Asia" (emphasis added).

Twining wrote:

> Up through 1960, "strategic deterrence" was the real teeth in the policy of containment. Strategic deterrence, until the advent of the ballistic missiles, meant only one thing—the U.S. Strategic Air Command: the bombers, the tankers for mid-air refueling, the trained crews, the support structure, the organization, the plan, the will, and the weapons ... . From the end of World War II, and the hasty demobilization that followed, until the fall of 1949, military support of United States foreign policy rested on a capability for atomic retaliation, and upon little else.

Did Twining ever get an answer on the origin of the UFOs so convincingly accepted as real in the 1947 AMC Opinion letter?

In discussing the policy of containment of the Soviet Union and communism from 1950 to 1960, Twining wrote:

> Our government elected to use the most effective form of firepower which was available. That was nuclear energy ... the force-in-being was tailored for use of, and reliance on, nuclear weapons. The force for tomorrow, in the research and development stage, was also tailored for the use of nuclear firepower. Conventional TNT and .30-calibre type firepower was retained, but the specific military directive for defense of NATO Europe provided for the use of nuclear weapons from the outset of war; and U.S. military planning for major confrontation in any other part of the world was also predicated on the use of nuclear weapons. Therefore, over a ten-year period our total U.S. force structure was methodically tailored to the use of nuclear weapons. *There really was no other way* in which the military services could have even partially met the demands of the U.S. national policy. (emphasis added)

In summary, according to Twining, nuclear bombs and the means to deliver them (bomber aircraft and ballistic missiles) were America's best defense against an aggressive spread of the Soviet Union. He made no mention at all about flying saucers.

In the section of the book titled "Acquisition of the New Combat Aircraft," Twining wrote that ballistic missiles took precedent over advancing bomber technology. And research and development of aeronautical technology was stifled due to "cost/effectiveness, the 'building-block approach' to new systems, and the maintenance of capability to 'exercise later options.'" This approach "tended to slow down military technology of all kinds, particularly progress in the aeronautical sciences."

That's an *if* at the beginning of that quote. Had there been Soviet flying saucers already screaming through the skies, it's doubtful there would be an *if*.

This suggests that any revolutionary, new, or advanced aircraft such as that described in the AMC Opinion were not part of the U.S. arsenal.

Twining describes what the United States had regarding air power, noting that from 1945 to 1956, sixteen bomber-type aircraft were tested along with another dozen designs partially developed. He wrote, "The over-all program resulted in the bombardment force of Boeing-built B-52's, Boeing-built B-47's, Convair-built B-58's, Martin-built B-57's, North American-built B-45's, and the Douglas-built B-66's."

Regarding fighter technology, Twining wrote that after World War II up to 1956, twenty-three types of fighters were developed. From these, only three were selected for service: the F-84, F-86, and the 100 Series. He wrote, "Between 1956 and the end of 1964, a nine-year gap, there was no 'first flight' of a new production series of high-performance USAF fighters."

Twining does discuss what he calls special things done with fighter aircraft technology such as the U-2 and SR-71 as well as the TFX series fighter airplane. However, that's it.

If in any place in this book U.S. owned and operated flying saucer technology from 1947 or later was going to be discussed, the "Acquisition of the New Combat Aircraft" section would have been it. As if to drive home the fact that nothing quite as fantastic as flying discs were available, Twining wrote, "I am certain of one thing today—performance of the Air Force mission in the future stands in jeopardy because that service is not permitted to build enough experimental or prototype aircraft under today's politically oriented cost/effectiveness programs."

A Soviet Union Secret Flying Saucer Program?

Twining reported on the 1947 Finletter Committee, established by President Truman to prepare a proper aviation policy. The committee's report, *Survival in the Air Age*, says that "if other nations develop the means of direct assault on the United States by supersonic piloted aircraft, the threat to this country will be serious, even though these vehicles are not equipped with atomic or comparable weapons." That's an *if* at the beginning of that quote. Had there been Soviet flying saucers already screaming through the skies, it's doubtful there would be an *if*.

Twining wrote that after World War II, the Soviets were progressing quickly in technological prowess. He wrote that they were concentrating on "aircraft production, the development of nuclear weapons, and on the exploitation of rocket technology. Two B-29 bombers forced down in the Soviet Union were impounded, taken apart, analyzed, and a copy reproduced by the U.S.S.R. became known as the TU-4." Why would the Soviet Union want a B-29 if they had the saucer?

Finally, Twining wrote about a June 1956 trip to the Soviet Union where he was accompanied by a group of people including "individuals who were well qualified in aircraft evaluation, intelligence, operations, research and development, and training techniques." The purpose of the trip was to witness a review of Soviet air capabilities. Twining wrote that the party attended an air show, an engineering school, an aircraft-engine manufacturing plant, an assembly plant, and other places of similar interest. At the conclusion of the tour, Twining noted how the party concluded the Russians had

American B-29 bomber and the Soviet TU-4 bomber

"come a very long way in the last few years in their research and development efforts, particularly as applied to weapons systems." But nothing of great urgency is mentioned—certainly nothing regarding any technology that rivaled that of the United States.

According to Twining, nuclear bombs and the means to deliver them (bomber aircraft and ballistic missiles) were America's best defense against an aggressive spread of the Soviet Union.

Nowhere in *Neither Liberty Nor Safety* does Twining show the slightest concern that the United States was overtaken in air superiority by the Soviet Union, let alone having its airspace invaded by Stalin's flying saucers. If the Soviet Union did possess such aircraft, surely Twining would have mentioned it in the book as a reason new instead of building-block technology was necessary and why such technology should be pursued regardless of cost.

Was an Extraterrestrial behind the Flying Saucers?

Twining quoted a 1947 paper by Major General Orville A. Anderson discussing what constituted a threat to the United States:

> We know that our only possible military enemy in the foreseeable future is a land mass power—operating on interior land and river lines of communication. We know that this power, geographically and economically, is not particularly vulnerable to sea blockade and strangulation.

Then afterward, the Soviet Union is discussed, which fits these criteria.

Throughout *Neither Liberty Nor Safety*, Twining is clear the danger remained the Soviet Union and the spread of communism. Nothing at all is referenced regarding a threat, extraterrestrial or otherwise. Twining summed up using the words of General Omar T. Bradley addressing the 81st Congress in 1949: "We assume that the *only dangerous force in the world today is Communism*" (emphasis added).

Interpretation of "Soviet saucer"

An objection could be made that because flying saucers weren't a threat, Twining's book wouldn't mention them because it wasn't part of the subject matter. And it's also true that major U.S. government studies from the Robertson Panel to the Condon Committee concluded there were no threats from UFOs; fair enough. The best we can say at this point is that Twining finished his career and passed away without relying on flying saucer technology in defense of the United States nor advising against a strategy to defend against the same nor even bothering to mention them, even as possible alternatives to existing military aerospace technology. For all intents and purposes, regarding General Twining, it turns out they never existed as a fully functional, viable option.

Also, let's not forget that if the United States had such technology, people such as Wernher Von Braun and other scientists wouldn't continue working with chemical rocket technology. Or as Richard Thieme told the DEF CON 21 audience in 2013, "When Edgar Mitchell, Apollo 14 and walked on the moon, said to me with a very straight face, 'Richard,' he said, 'If we can do what they (UFOs) can do, they would not have sent me to the moon in a Tin Lizzie.'"

From all the available evidence, it appears that in 1947, the U.S. military was accepting anecdotal reports of flying saucers at face value. Perhaps they did so as a precaution to ensure no foreign threats were present. Missing something such as advanced enemy aircraft over one's own territory could have been disastrous. The United States engaged in several studies to ensure the matter was not a threat. No threat was ever found, and officially the subject was closed two decades later. And at least in the recommendation and analysis of General Nathan F. Twining, a national defense policy was not prepared with them in mind as if the matter never existed at all. ■

Further Reading

Biography of General Nathan F. Twining. Available online at https://www.af.mil/About-Us/Biographies/Display/Article/105367/general-nathan-f-twining/.

DEF CON 21 - Richard Thieme - The Government and UFOs A Historical Analysis. Available online at https://www.youtube.com/watch?v=r8k5kGbCR0M.

Swords, Michael, et al. 2012. *UFOs and Government: A Historical Inquiry*. San Antonio: Anomalist Books.

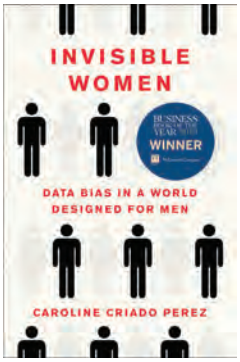
Twining, Nathan F. 1947. AMC Opinion Concerning "Flying Discs." Letter to Commanding General, Army Air Forces. September 23.

———. 1966. *Neither Liberty Nor Safety: A Hard Look at U.S. Military Policy and Strategy*. New York: Holt, Rinehart and Winston.

Eric Wojciechowski has a BA in psychology from Oakland University. He writes on politics, religion, pseudoscience, and woo. Other published works can be found at Skeptical Inquirer, *American Atheists*, *Free Inquiry*, and *Skeptic*.

The Hidden Biases Men Just Don't See

Carol Tavris



Invisible Women: Data Bias in a World Designed for Men. By Caroline Criado Perez. New York: Abrams Press. 411 pp. Hardcover, $27.00.

Unlike many popular books on gender differences and conflicts, *Invisible Women: Data Bias in a World Designed for Men* refreshingly ignores brains, personalities, and stereotypes. Instead, Caroline Criado Perez shows why sexism (efforts to discriminate against women and keep them out of traditionally male spheres) and misogyny (hatred of women) are not the only problems women face on the road to equality. The third roadblock is what she calls women's "invisibility," and it is in some ways the most difficult to jump over, because, by definition, most of us—women and men alike—simply don't see it.

Criado Perez doesn't mean that women are literally invisible, of course—not with all the noise that women have been making about sexual, political, and professional rights. She means that in a world that men have created and designed, men hold a deeply embedded, unconscious assumption that their way of doing things and solving problems is the normal, inevitable way. This is not a malevolent feature of the male mind; all of us are biased to see our way of doing things as the best way, designing solutions that work for us without paying much attention to whether those solutions work for other groups we're not thinking about. But gender is a universally powerful category, and as Criado Perez shows in a well-researched and dazzling array of examples, women's "invisibility" can produce consequences that range from the minor to the irritating to the fatal.

Consider, she says, how many items and practices are designed with reliance on the average ("normal") male body: iPhones and smart watches; uniforms for the military and safety workers; temperatures in offices set at a level more comfortable for most men rather than women; VR headsets that are too wide for many women and more likely to generate motion sickness; voice commands that often don't register women's higher voices. For decades, car safety design was determined with crash-test dummies based on the average height and weight of males, who are assumed to be, as usual, in the driver's seat. Some efforts to remedy that problem have been made, but even female dummies are primarily tested in the passenger seat. Given that women are far more likely than men to be seriously injured in a car crash, Criado Perez observes that is "one hell of an inequality to be overlooking."

In a splendid early chapter that sets the stage for the surprises that follow, "Can Snow-Clearing Be Sexist?," Criado Perez shows why the answer is yes. In Sweden (as elsewhere), snow clearing began with major traffic arteries and ended with clearance of pedestrian walkways and bike paths. Reasonable, right? Wrong. This way of prioritizing snow clearance was affecting men and women differently because women's needs were invisible to city planners. Women are more likely than men to walk and take public transport, and they travel more throughout the day, because of child- and elder care, marketing, errands, and the like. Thus, the city's snow-clearing plans were not gender neutral. The city planners switched the clearance plan to put pedestrians and transport users first, figuring it wouldn't cost more and would be easier to drive a car through three inches of snow than walk or push a buggy, wheelchair, or bike. To their surprise, the result was beneficial financially and medically. In snowy and icy conditions, pedestrians are injured three times more often than drivers, and the cost of pedestrian accidents due to ice is two to three times

higher than the cost of road maintenance. Making women "visible" significantly reduced the number of hospital visits and saved the city money to boot.

Every woman who has ever waited for what seems like hours to use a public bathroom stall, namely all of us, will read Criado Perez's chapter on sanitation with a mix of exasperation and fury. Here is a case in which "equal" is inherently unfair: having the *same* number of bathrooms in public spaces is *unequal*, because women take up to 2.3 times as long as men to use the toilet—not only because of tampon use but also because women are more likely to be accompanied by children, to be old or disabled and need more time, and to be pregnant or have urinary infections that increase the frequency of urination.

More worrisome, hazmat suits, police vests, and other "Personal Protective Equipment" (PPE) are designed for men, with little to no accounting for women's breasts and hips and certainly no accounting for differences in how difficult and even hazardous it is for women to use a toilet when having to remove the top as well as bottom of a body suit, as when working in frigid weather and risking frostbite. (Yes, they know about pee shooters.) For women, PPEs are usually neither personal nor protective, forcing them to choose between struggling with outfits that don't fit and are even painful or being unprotected from knives, impacts, and guns.

Perhaps the most important chapters are those on the persistence and consequences of the male norm in medicine: in the research questions asked, in the development and effectiveness of drugs, in diagnosis and treatment. Doctors rarely learn that sex differences are found in "every tissue and organ system in the human body." If a woman's symptoms don't fit a doctor's preconceived notion of what they indicate (as with heart disease) or if the doctor can't easily find the cause of her symptoms (as often happens with endometriosis, when uterine tissue grows outside the uterus, causing immense pain), her complaints are likely to be trivialized or dismissed. Treatments that might have benefitted women have been rejected because they didn't work in men, and many treatments that do benefit men (e.g., statins to prevent a first heart attack or hypertensives) don't work as well, or even work at all, in women. Effective dosages of many drugs, standardized on men, differ in women (and, by the way, in old people and non-white populations). That these mistakes are still going on is a scandal; Criado Perez writes: "Women are dying, and the medical world is complicit."

By emphasizing how many problems occur because of women's invisibility rather than men's misogyny, Criado Perez opens our eyes to creative solutions that benefit everyone. For example, in the 1990s, Viennese researchers found that after age ten, girls stop using public parks and public playgrounds. Why? Something in girls' wimpy nature or boys' aggressive nature? Should girls be taught to lean in and boys ordered to lean out? The problem was that the parks were designed as large open spaces, which forced girls to compete with boys for the space. Most girls didn't want to compete or lacked the confidence to demand territory, so they let the boys have it. But when parks were subdivided into smaller areas, girls returned. Similarly, think of all the sports areas you have seen, those large barren spaces enclosed by ugly wire fencing, with one entry—enabling boys to congregate there and taunt girls wanting to enter. No wonder girls stop using these spaces; who wants to run the gauntlet of obnoxious boys or teenage louts? A woman designer came up with the solution: create more entrances and wider ones; subdivide the sports courts and provide more space for informal activities that girls like. Now all parks in Vienna are designed this way, and the sex difference in use of the parks has evaporated.

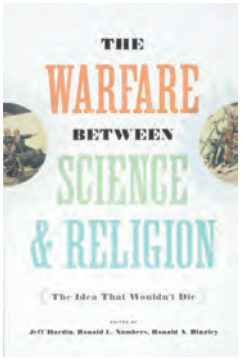
The theoretical underpinning of this book is not new; every generation of feminist scholars rediscovers Simone de Beauvoir's 1949 observation that women are the second sex, the "quintessential Other," eternally measured against men and found different, deficient. Likewise, some of Criado Perez's observations have been known for decades, ever since women began entering fields formerly closed to them. Man the Hunter wasn't enough without Woman the Gatherer. Man the Promiscuous found Woman the Equally-If-Not-More Promiscuous. Mankind the Violent and Competitive met his partner in Humankind the Peaceful and Cooperative. Man the Paid Worker learned that he contributes far less to the world economy than Woman the (Invisible) Unpaid Worker whose housework and caretaking activities are indispensable. But Criado Perez adds to this list other discoveries that scientists have made once they let women in the door: Ancient cave paintings assumed to be the work of male hunters? Analysis of handprints suggests the majority were created by women.

Criado Perez is fully aware of the wrath of men toward women who dare to become visible—a rage that seems to be escalating as women continue their march into politics, science, and technology. That anger, she argues, comes "from a place of fear"—fear of losing power and status they assume is rightfully theirs. "I believe that the onus is on those of us who feel able to weather the storm, to do so," Criado Perez admonishes her young readers. "Our" generation of women has to weather this storm, she says, "in order that the women who come after us don't." This sentence did make me smile; we older readers are apparently invisible to her! My mother lived it ninety years ago. De Beauvoir could have written it seventy years ago. I could have written it thirty years ago—and did. Women have been weathering the storms of misogyny, sexism, and invisibility for centuries. Criado Perez doesn't look backward to see how far we have come, but this splendid book certainly illuminates the path going forward, revealing how much remains to be done. ■

Carol Tavris is a social psychologist whose books include *The Mismeasure of Woman* (1992) and, with Elliot Aronson, *Mistakes Were Made (but Not by ME)* (revised edition, 2020).

No War between Science and Religion? Many Scientists Disagree

Howard Feldman



The Warfare between Science and Religion: The Idea That Wouldn't Die. Jeff Hardin, Ronald L. Numbers, and Ronald A. Binzley, editors. Johns Hopkins University Press, 2018. ISBN 9781421426181. 368 pp. Softcover, $39.95.

In the introduction to *The Warfare between Science and Religion*, its thesis is clearly laid out: "There has never been a systemic warfare between science and theology, and this book explains why the notion nonetheless lives on." The editors further state that the idea of a struggle between science and religion is hard to eradicate and that historians have successfully demonstrated that there is no such struggle. This was previously argued in Joshua Moritz's book *Science and Religion* (2016), but this new book takes a different approach with a series of chapters, each written by accomplished experts in their fields (and partially based on books they previously published), that breaks down the argument into components that are each examined in detail. The first portion of the book reviews the history of the alleged struggle, its origins, and associated myths. Then comes a series of chapters on the major religions and Christian denominations and finally summaries of the views of atheists, historians, and scientists.

A common theme in the book is that the modern warfare model traces back to two works from the late nineteenth century: John William Draper's 1874 *History of the Conflict between Religion and Science* and Andrew Dickson White's 1896 *A History of the Warfare of Science with Theology and Christendom*. Both books advanced the thesis in which there is an inevitable conflict between science and religion. But each is criticized for being motivated by outside factors and not referencing the historical evidence. White is criticized for letting his arguments with the church about the founding of Cornell University bias his views, while Draper is criticized for documenting his conclusions with erroneous and misleading statements.

A common theme in the book is that the modern warfare model traces back to two works from the late nineteenth century.

Further exploration of the history of the alleged conflict comes in a chapter delving into the Galileo Affair. Here Maurice Finocchiaro (who previously wrote several books on the subject) tells us that the trial was not just about a conflict between science and religion but that there was a deeper conflict between conservatives and innovators in the church. As a result, it was possible to be a devout Catholic at that time and see no conflict with the heliocentric model. Thus, the conflict between science and religion is not as clear as a simplistic analysis of Galileo's trial and subsequent house arrest might suggest.

This is followed by a series of chapters on how different segments of society, parsed more or less along religious lines, view the conflict. For Catholics, Protestants, Jews, and Muslims, there just is not much of a conflict—or only within the minor conservative elements. The chapter on Protestant evangelicals by Bradley Gundlach (a friend of mine) also refers back to Draper and White and goes on to establish that even within the evangelical community, the prevailing view was that there is no serious conflict.

Special criticism is focused on the New Atheists (particularly Sam Harris, Richard Dawkins, Daniel Dennett, Jerry Coyne, and Christopher Hitchens), who all claim that organized religion is antithetical to science. But how could they reach the opposite conclusion of the his-

torians and other experts who contributed to this book? The answer, the latter say, is that "none of the New Atheists is a historian" (223). Their analyses lacked historical context and commonly was in conflict with historical data. At this point we can also note that none of the authors of this book is a scientist other than biologist Jeff Hardin. He is author of the New Atheist chapter and first-named editor of the book.

The thesis of no conflict is further supported by an analysis of modern scientists' religious views based on a survey of over 6,000 scientists in eight countries. The authors conclude that despite the popularization by a few "celebrity scientists" (such as Dawkins) most scientists do not perceive a conflict between science and religion. However, the surveys also revealed that the conflict thesis is more widespread in the western countries surveyed (the United States, the United Kingdom, and France), where scientists were significantly less religious than the general populations.

So, is it true that the conflict thesis has been greatly exaggerated and that there is little evidence to support it? The book is not an investigation into evidence for and against the conflict thesis but rather an investigation of why the claims of conflict are so inflated. Thus, there is no real evaluation of much of the recent evidence. The book was based on a conference supported by the Issachar Fund to understand why the conflict thesis persists despite historical evidence to the contrary. The Issachar Fund is a private operating foundation that "supports learning that moves beyond amassing information and toward enriching communities of faith and the flourishing of our society." The conference brought together historians, sociologists, and philosophers to investigate the persistence of the conflict thesis.

Notably missing from that conference (based on its description) were any scientists to offer their perspective. Also missing from the book is the abundant evidence of the modern conflict in the United States. Although people of most religions may not perceive a conflict, there is a narrow evangelical interpretation of biblical chronology that conflicts with much of science. This narrow interpretation of Christian philosophy is very popular in the United States and has impacts reaching far beyond churches and science labs. This particular dimension of the conflict is not investigated in any detail, and where it is described, it is inaccurate. The young-earth creationists (YECs) are briefly described in the New Atheists chapter where the Institute for Creation Research (ICR) is described as "venerable." Kind appraisals of intelligent design proponents such as Phillip E. Johnson and Alvin Plantinga are based on philosophical arguments lacking reference to any data in support of evolution without supernatural guidance. And there is no discussion of the philosophical implications of the scientific method, specifically that supernatural intervention cannot be considered because it immediately shuts down scientific inquiry.

The book claims it was possible in the time of Galileo to be a devout Catholic at that time and see no conflict with the heliocentric model.

There is also a long list of evidence of direct conflict that is either not mentioned or mentioned only in passing. There are only brief mentions of the "venerable" ICR and Ken Ham's Answers in Genesis and the Creation Museum. No mention is made of the organizations on the other side, such as the National Center for Science Education (NCSE), which was created specifically to fight attempts to force creationism into public schools.

Most puzzling is the lack of mention of the constant flow of antiscience bills, mostly at the state level, that attempt to water down the teaching of evolution or insert creationism into the classroom. These bills are all religiously motivated, and their numbers belie any claim that the conflict is mostly in the minor backwaters of Christianity. This is direct evidence of the actions and real-world consequences of young-earth creationists today. According to the NCSE, in 2019 antiscience bills that could weaken teaching of evolution have been introduced in Arizona, North Dakota, South Dakota, Oklahoma, Iowa, Indiana, South Carolina, Florida, and Maine (see https://ncse.ngo/catalyzing-action). The Indiana bill would specifically allow the teaching of creationism in public schools. This proposed legislation is too recent to have been included in the book, but similar bills are proposed every year. And there is no discussion of how the proposed bills have evolved over time to attempt to pass constitutional muster, in part based on the two modern creationist trials, *Kitzmiller v. Dover* (2005) and *McLean v. Arkansas* (1981), neither of which is mentioned in the book.

Other evidence not mentioned are the many scientific organizations that have come out against creationism. The ACLU lists about fifty scientific societies that specifically oppose the teaching of creationism or intelligent design (https://www.aclu.org/other/what-scientific-community-says-about-evolution-and-intelligent-design). If there was no active campaign to infiltrate creationism into science classrooms, these organizations would not need to issue statements supporting science and against creationism.

The final chapter, "The View on the Street" by John Evans, is the most direct analysis of the conflict between YECs and science. He claims that YECs dissent from "very few scientific claims … only about human origins." He further states that evolution and the big bang cannot be observed and thus are merely speculation. This, and similar statements in the chapter, reveal a profound lack of

understanding of how science works and that theories of ancient events can be scientifically tested.

Evans correctly states that scientists get upset because evolution is important to biology, but he does not appreciate just how central the YEC attacks are on science. YECs dissent from the core theories uniting several sciences. These include:

1. Evolution (not just human evolution), the central unifying theory of all biology and paleontology
2. Plate tectonics, the central unifying theory for all of geology
3. The big bang theory, central to all of astronomy and cosmology

Very little in science makes sense except in light of these theories, and they are all being attacked through social media, schools, and in legislation.

Repeatedly in the book we read the statement that there is no conflict between science and religion. But what does this mean? Even stout creationists will agree with this, while rejecting evolution. For example, William Bell Riley in the early 1900s was a Baptist defender of his faith and opposed to evolution but still stated that "Science and the Bible are not in conflict" (Chapter 9, p. 175). And more recently, along the same lines is the 2012 DVD by Ken Ham, *Science Confirms the Bible*. In the book's chapter on evangelical Protestants, Gundlach ends by noting that "evangelicals agreed that the conflicts between science and religion were ultimately misconceived, for true science and true religion could never finally conflict." Statements such as these are ultimately meaningless and attempt to downplay the conflict because each side gets to choose what is true science and what is true religion.

The narrow interpretation of Christian philosophy is very popular in the United States and has impacts reaching far beyond churches and science labs.

The book defends a common theme among historians that there is no inevitable conflict between science and religion. This may be true for many religions and denominations but is certainly not true for many Americans who perceive evolution and an ancient universe as a direct threat against their religious views. The book minimizes the conflict by devoting many pages to religions that do not conflict with science while virtually neglecting the conflict between YECs and science, misstating the depth of the conflict, and just ignoring almost all the modern evidence of the conflict in the United States. For a book about the warfare between science and religion, they left out most of the modern battles. ■

Howard Feldman has worked as a petroleum geologist and paleontologist for the past thirty years. He has published technical articles in geology, mostly stratigraphy.

You can make a lasting impact on the future of skepticism when you provide for Skeptical Inquirer in your will.

The Committee for Skeptical Inquiry and Skeptical Inquirer are leading voices of critical thinking in fields ranging from homeopathy to paranormal claims. You can take an enduring step to preserve their vitality when you provide for Skeptical Inquirer in your will.

Your bequest to the Committee for Skeptical Inquiry, a program of the Center for Inquiry, Inc., will help to provide for the future of skepticism as it helps to keep Skeptical Inquirer financially secure. Depending on your tax situation, a charitable bequest to the Committee may have little impact on the net size of your estate—or may even result in a greater amount being available to your beneficiaries.

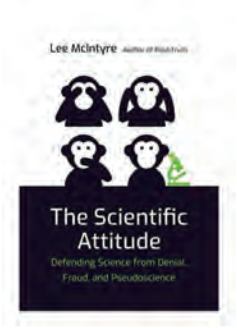
A variety of arrangements are possible, including: gifts of a fixed amount or a percentage of your estate; living trusts or gift annuities, which provide you with a lifetime income; or a contingent bequest that provides for Skeptical Inquirer only if your primary beneficiaries do not survive you.

CSI Committee for Skeptical Inquiry Skeptical Inquirer The Magazine for Science and Reason

For more information, contact:
(716) 636-7571, ext. 428. All inquiries are held in the strictest confidence.

Truth Matters, and the Scientific Attitude Helps Find It

HARRIET HALL



The Scientific Attitude: Defending Science from Denial, Fraud, and Pseudoscience. By Lee McIntyre. MIT Press, 2019. ISBN 9780266039833. 296 pp., $27.95.

Science is under attack. The evidence for global warming is overwhelming, but many reject the evidence in favor of ideology and just believe what they want to believe. Vaccine-preventable diseases are rebounding due to rejection of vaccine science and the circulation of egregious misinformation. There are many misunderstandings about science, even among scientists. In this "post-truth" world, we must be able not only to explain why claims based on scientific evidence have a superior claim to believability but also to persuade the public to accept them over competing claims that are not based on empirical evidence but instead on ideology or wishful thinking.

Lee McIntyre, a philosopher of science at Boston University, has spent his entire career grappling with this problem. In his new book, *The Scientific Attitude: Defending Science from Denial, Fraud, and Pseudoscience*, he tries to explain what science is by examining what it is not. He writes, "there is much to learn from those who have forsaken it." He argues that "the scientific attitude" is the key, even though it is difficult to pin down.

There's no such thing as "the scientific method"; the simplistic "observe, hypothesize, predict, test, analyze, and revise" model does not describe how most scientific discoveries are actually made. Penicillin was discovered not by systematically applying a "scientific method" but rather by serendipitously profiting from an accidental contamination. The demarcation problem (drawing a line between science and nonscience) has never been satisfactorily solved. Criteria such as falsifiability showed promise but were flawed. McIntyre's goal is to provide a way to show what is distinctive about science without solving the demarcation problem.

McIntyre's goal is to provide a way to show what is distinctive about science without solving the demarcation problem.

No matter how good the evidence, science can never prove the truth of any empirical theory. Theories are always tentative and subject to revision based on better evidence. But this doesn't mean we have no grounds for believing a scientific theory. Evidence counts. Predictability is compelling. Good theories don't require knowing the mechanism; we knew penicillin worked long before we understood how it worked. He draws a distinction between truth and warrant. A theory has warrant if it has a credible claim to believability given the evidence, even though we can't prove it's true in any absolute sense. We can be comfortable accepting a warranted theory even though we realize it might eventually be proven wrong. We can celebrate uncertainty, and we can require denialists and conspiracy theorists to defend the warrant of their beliefs rather than simply attacking our science.

Einstein had the true scientific attitude. He said experimental confirmation would not establish the truth of his theory, but he would have to accept that his theory was untenable if it failed certain tests. Specific methodology is less important than honesty and openness. Individuals must be willing to critique their own ideas, but criticism is also a communal and institutional self-correcting enterprise. We try to find failure. Science is value-laden and can never be purely objective; McIntyre writes, "It is a myth that we choose our beliefs and theories based only on the evidence."

Ignaz Semmelweis had the scientific attitude far ahead of his time; his ideas were met with unreasoned opposition, and McIntyre notes that "Until quite recently in the history of medicine, patients often had just as much

to fear from their doctor as they did from whatever disease they were trying to cure." Benjamin Rush was a strong advocate of bloodletting to balance the humors; perhaps it was fitting that he died of bloodletting when it was used to treat his typhus fever. In his day, patients treated by a doctor for compound fracture had only a 50 percent chance of survival. Gradually doctors accepted that they could learn from experiments. The scientific attitude prevailed, and modern medicine was born.

True skeptics reject new ideas that are believed without sufficient evidence and change their minds to adopt new ideas that are based on good evidence.

According to a popular myth, penicillin was discovered by accident—but it was no accident. Fleming responded to a chance contamination with a prepared mind, understood that it showed antibiotic properties, published his findings, and others tested and developed the drug. The individuals involved all had the scientific attitude.

Science can go wrong in many ways: p-hacking, cherry-picking, sloppiness, laziness, cognitive bias, unintentional errors, intentional falsification or fabrication of data (sometimes with "good intentions" because they are sure they are right and want to speed the process along), and deliberate fraud, as in the case of Andrew Wakefield, whose now-retracted study on autism led to vaccine refusals and measles resurgence.

The most valuable chapter of the book is "Science Gone Sideways: Denialists, Pseudoscientists, and Other Charlatans." Those people either misunderstand or don't care about the standards of scientific evidence—or if they do care, they don't care enough to modify or abandon their ideological beliefs. He defines denialism as "the refusal to believe in well-warranted scientific theories even when the evidence is overwhelming" and pseudoscience as when someone seeks the mantle of science to promote a fringe theory but refuses to change their beliefs in the face of refuting evidence or methodological criticism. This is dangerous, because people who have an economic, religious, or political interest in contradicting certain scientific findings "have resorted to a public relations campaign that has made great strides in undermining the public's understanding of and respect for science."

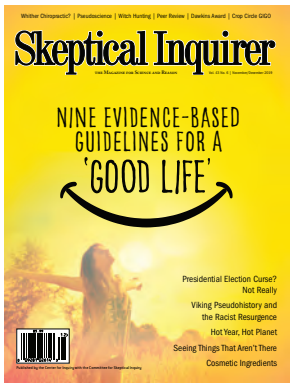
Denialists and pseudoscientists may believe that they are living up to the highest standards of the scientific attitude, but they are not. When the evidence conflicts with a sacred belief, people who believe they already know the answer will reject science. Superstition and willful ignorance are not new, but what is new is "the extent to which people can find a ready supply of 'evidence' to support their conspiracy-based, pseudoscientific, denialist, or other outright irrational beliefs in a community of like-minded people on the Internet." It is easy to avoid conflicting views and to live in a fact-free alternative reality. Group consensus works well in science as a check against error, but outside of science, charlatans use consensus to reinforce prejudice.

Denialists like to call themselves skeptics and claim to be open to new ideas, but true skeptics reject new ideas that are believed without sufficient evidence and change their minds to adopt new ideas that are based on good evidence. "For denialists, no evidence ever seems sufficient for them to change their minds." This is not a scientific attitude; it is the opposite of having an open mind. They demand impossibly high standards for disconfirming evidence but demonstrate complete gullibility for any claim that supports their belief system; for instance, they don't need evidence to believe the claim that the CDC paid the Institute of Medicine to suppress the data on thimerosal.

Denialists and pseudoscientists like to point out that cranks can sometimes get it right. They laughed at Galileo, for example, but Galileo was not a crank; he had evidence to support his assertions. The book tells the story of J. Harlen Bretz, a maverick geologist who found evidence that a massive flood had created the channeled scablands of Eastern Washington. He realized that what he saw could not be explained by uniformitarianism, the generally accepted dogma that geologic processes act gradually over time. He didn't know what could have caused such a mega-flood, but others found the explanation: the failure of a giant ice dam at prehistoric Lake Missoula. He was long considered a heretic, but his evidence was overwhelming. Others could see the evidence for themselves. Bretz was vindicated in 1965 when geologists went on an official field trip and sent him a telegram saying, "We are all catastrophists now." It took awhile, but the scientific attitude eventually triumphed. "The crucial question for pseudoscientists is this: if your theories are true, where is the evidence?" If you have good answers, you will not be persecuted or ignored; science will eventually beat a path to your door.

McIntyre says the core difference between what is science and what is not hinges on the scientific attitude. He hopes that his concept of the scientific attitude will put us in a better place to understand and defend science and to grow it in new fields such as the social sciences. Truth matters, and if we care about empirical evidence and use it to shape our theories, we can avoid remaining, as he puts it, "mired in the ditch of ideology, superstition, and confusion." Our very survival as a species may depend on it. ■

Harriet Hall, MD, writes about science and pseudoscience on her website, on the website Science-Based Medicine (where this review originally appeared), and in the SKEPTICAL INQUIRER, where she is a regular columnist and contributing editor.


Skeptical Inquirer
NINE EVIDENCE-BASED GUIDELINES FOR A 'GOOD LIFE'
Presidential Election Curse? Not Really
Viking Pseudohistory and the Racist Resurgence
Hot Year, Hot Planet
Seeing Things That Aren't There
Cosmetic Ingredients

Nine Evidence-Based Guidelines

I read with interest Gary Bakker's article promoting evidence-based guidelines for a "good life" (November/December 2019). Yet I was left pondering the nature of the evidence proposed to support the nine suggestions.

In his introduction, Dr. Bakker promotes the use of randomized controlled trials (RCTs). A key feature of RCTs is, of course, randomization, and it is unclear if Dr. Bakker's evidence is based on him having randomly assigned his clients to one of several possible treatments that have been proposed for their conditions. There are also questions about outcomes measured: one might reasonably be skeptical of an RCT taking as an outcome a self-declaration, "This helped me."

While we should all embrace evidence-based thinking, we must be careful about the nature of the evidence we accept.

Prof. Bruce Dunham
Department of Statistics
University of British Columbia
Vancouver, B.C.
Canada

I certainly have no quarrel with the nine bits of advice Gary M. Bakker hands out for how to live a good life. They seem quite sensible, practical, and humane.

But I do quibble with the characterization that they are somehow nobler or more rigorous than various self-help books or collections of bromides, also all based on the personal experience of the authors rather than the gold standard that Bakker himself holds up: "randomized controlled trials (RCTs)."

The fact that Bakker has put in forty years paying careful attention to feedback from his own patients as to what they found effective is hardly more convincing than the thousands of testimonials from patients who have "benefitted" from homeopathy, reiki, or megadoses of vitamin C. They comprise anecdotes, not data.

What were his nine rubrics compared to? What was the control group for each? What were the alternative approaches?

Richard S. Russell
Madison, Wisconsin

Gary Bakker replies:

The interventions I have trialed have been derived from an immense amount of controlled research—RCTs and other designs—by thousands of researchers from around the world over the past forty years that support the theories and approaches/techniques I described in the article. I did not cite this tremendous volume of research in my essay. It is not a systematic review or meta-analysis of RCTs published in a specialist peer-reviewed journal. It is a summary article for the general public drawing on my decades of reading just such reviews. Readers could perhaps partially check my credentials by reading one of my properly referenced, peer-reviewed articles (e.g., on the technique of thought-stopping), but what they will find is a densely referenced, tight, complex, fully empirically justified, extensive argument supporting one tiny useful conclusion. This is hardly of interest to a general reader. Much better to let me spend a lifetime looking these up, bringing them together, even trying them out to see whether they are at least implementable, and then summarizing them as practical "guidelines."

Witch Hunting

The Commentary "Witch Hunting Requires an International Response" by Leo Igwe (November/December 2019) was quite interesting, and the situation obviously requires action.

However, Mr. Igwe's appeal to the United Nations for action is a losing proposition. Such a referral to the UN would probably entail the Human Rights Council. At least two of the offending countries mentioned in the article are members of the Council: Burkina Faso and Nigeria. Among other questionable members are China, Democratic Republic of Congo, Egypt, Pakistan, and Saudi Arabia. Perhaps worst of all is the recent election of Venezuela.

Any solution to the "witch hunting" problem will have to come from somewhere other than the United Nations.

Robert S. Kennedy Jr.
Boise, Idaho

Leo Igwe replies:

The writer makes a very cogent observation, that given the current constitution of the Human Rights Council, the resolution of the witch hunting problem lies outside the UN. However, the evidence before us at the moment suggests the contrary because several member states heavily supported a draft resolution that was sent to the UN meeting in September. Incidentally, it was Brazil that blocked the process of adoption due to concerns over the rights of pagans and the practice of paganism in that country. Those sponsoring the resolution are making necessary consultations and hope to resubmit a revised copy for adoption when UN member states reconvene in March.

Quackery at WHO

Your article "Quackery at WHO" had a disturbing line that sounded familiar: "That political and economic considerations play a more important role in WHO than medical evidence-based science remains difficult to comprehend and accept."

I'd just finished reading a Cornell Alliance for Science web article titled "Europe Still Burns Witches—If They're Named Monsanto," outlining the campaign by European anti-GMO factions (and a block of crooked American lawyers) to punish Monsanto by having an obscure WHO offshoot declare Roundup a "Class IIA" carcinogen (along with drinking hot beverages over 65 degrees C and being a hairdresser). The article dates to late 2017, and recent lawsuits proclaim their success.

Cresson Kearny
Albuquerque, New Mexico

Science Fiction Can Inspire Science

In "Percival Lowell and the Canals of Mars, Part II" (November/December 2019), the authors rightly advocate better education in the sciences, but their dismay that without such education "the average person is likely to start thinking about Vulcans or Captain Kirk whenever the word *planet* is mentioned" may be doing science fiction a disservice. No doubt there are astronomers and cosmologists working today who grew up watching the series that gave us the name of the first space shuttle and posited a future where a United Federation of Planets sent their version of the *Enterprise* on a voyage of peaceful exploration. Imaginative speculation about life on other planets has produced some ideas—such as the Martian canals—that turned out to be completely wrong, but it has also produced fantasies that have entertained and inspired in ways that are perfectly compatible with an interest and enthusiasm for science.

Martin Stubbs
London, United Kingdom

Climate and Religious Views

In Kendrick Frazier's report "Hot Month, Hot Year, Hot Planet" (November/December 2019), his summary of Dan Kahan's observation (p. 13) that "group identities are powerful cohesive forces … and those allegiances determine how we respond" may be crucial. A significant proportion of climate change deniers appear to have fundamentalist religious views. As the evidence for climate change becomes overwhelming, we should expect that these believers will be encouraged and led by their religious leaders to switch from denial of climate change to the belief that climate change is real and has been brought about deliberately by their preferred invisible super being to send some message to humans. We should watch out for that and be prepared to expose the contradiction.

Don Martin
Toronto, Ontario
Canada

Chiropractic Placebo

Re: Harriet Hall's column "Wither Chiropractic?" (November/December 2010). The "benefits" of chiropractic (and acupuncture) are mostly subjective, making them difficult to substantiate. One exception is "improved hearing," which is easily debunked by an audiogram. These so-called benefits are the perfect examples of the placebo effect. And because chiropractic can be costly and sometimes harmful, physical therapy is the much better choice.

J. Richard Gaskill, MD
Los Gatos, California

Hate Crimes Up?

Brian Regal begins his article "Everything Means Something in Viking" (November/December 2019) by saying, "The growing racist, white supremacist, alt-right movement has taken on an incongruous aspect." I'm wondering what data Regal is using to support his claim that racism and white supremacists are on the rise.

A quick search of the FBI Uniform Crime Report shows there were fifty-five fewer hate crimes in 2018 than in 2017.

Mark Smith
via email

Brian Regal replies:

The New York Times *reported on November 12, 2019, that personal attacks motivated by bias or prejudice reached a sixteen-year high in 2018, according to the FBI's annual report issued that same day. The FBI report is at https://ucr.fbi.gov/hate-crime/2018/hate-crime.*

More on Psi's Claims

I agree with everything the authors of "Why Parapsychological Claims Cannot Be True" say in their original SI article and in their reply to the letter writers (November/December 2019). But here's an additional complication that influences people's response to such an article: We humans cannot help feeling that there's something in our being that goes beyond physical explanation. That feeling, however you characterize it (consciousness, soul, etc.), persists in many people who are otherwise perfectly comfortable with current scientific explanations of "outside" phenomena that use words such as *cannot* and *impossible*. Hence the continuing flow of publications supporting both types of explanation. I just did a Google search on "alternative explanation for consciousness," and after the Wikipedia hit, these two titles showed up in succession: "Science Can't Totally Explain Consciousness, and It Never Will …" and "Scientists Closing in on Theory of Consciousness."

Arleigh Hartkopf
via email

Thank you for publishing my concerns (Letters, November/December 2019) about Reber and Alcock's "Why Parapsychological Claims Cannot Be True" (July/August 2019). The authors' comments in reply, "McCann's point about the coordinated light from a parabolic mirror violating the ISL is based on a theoretical model. No such mirror has been built, and it is unlikely that it can be," necessitate rebuttal. Einstein used theoretical thought experiments to express his concerns over aspects of the Copenhagen interpretation of quantum mechanics. Thus, theoretical opposition of concepts has significant historical precedent. More damaging to the authors' argument is the fact that thousands, if not millions, of such mirrors have been built. They are called searchlights. The intensity of the beam from a searchlight does not satisfy the ISL, otherwise they would have been useless in tracking enemy planes in World War II. In short, the authors' assumption of the validity of the ISL is not justified.

Roger McCann
Brevard, North Carolina

Arthur Reber and James Alcock reply to McCann:

Mea culpa*: We should have given more thought in our response to McCann's initial comments. In our article, we stated, "In telepathy, the distance between the two linked persons is never reported to be a factor, a claim that violates the principle that signal strength falls off with the square of the distance traveled." McCann correctly pointed out that the inverse square law does not apply to a coordinated light source producing parallel rays. And although it is true that a perfectly coordinated, or "collimated," light beam cannot actually be produced because of diffraction, we agree that searchlights (and lasers) approach the theoretical ideal.*

However, McCann's point about coordinated light beams has no relevance here, because not even parapsychologists suggest that our brains focus or collimate telepathic communications to specific human targets. Instead, parapsychologists insist that telepathic signals can reach a target person anywhere in the world, even though his or her location is unknown to the sender.

For the Record

In "Another Scandal for Parapsychology" (November/December 2019) the phrase "p below the 0.5 level" should be "p below the 0.05 level."

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@skepticalinquirer.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

Committee for Skeptical Inquiry

Scientific and Technical Consultants

Gary Bauslaugh,
writer and editor,
Victoria, B.C., Canada

Richard E. Berendzen,
astronomer, Washington, DC

Martin Bridgstock,
senior lecturer, School of Science,
Griffith Univ., Brisbane, Australia

Richard Busch,
magician/mentalist, Pittsburgh, PA

Shawn Carlson,
Society for Amateur Scientists,
East Greenwich, RI

Roger B. Culver,
prof. of astronomy, Colorado State Univ.

Felix Ares de Blas,
prof. of computer science,
Univ. of Basque, San Sebastian, Spain

Nahum J. Duker,
assistant prof. of pathology,
Temple Univ.

Taner Edis,
Division of Science/Physics
Truman State Univ.

Barbara Eisenstadt,
psychologist, educator, clinician,
East Greenbush, NY

William Evans,
prof. of journalism and
creative media, Univ. of Alabama

Bryan Farha,
prof. of behavioral studies in
education, Oklahoma City Univ.

John F. Fischer,
forensic analyst, Orlando, FL

Eileen Gambrill,
prof. of social welfare,
Univ. of California at Berkeley

Luis Alfonso Gámez,
science journalist, Bilbao, Spain

Sylvio Garattini,
director, Mario Negri Pharmacology
Institute, Milan, Italy

Susan Gerbic,
founder and leader of the Guerilla Skepticism on Wikipedia (GSoW) project

Laurie Godfrey,
anthropologist, Univ. of Massachusetts

Gerald Goldin,
mathematician, Rutgers Univ., NJ

Donald Goldsmith,
astronomer; president, Interstellar Media

Alan Hale,
astronomer, Southwest Institute for Space
Research, Alamogordo, NM

Clyde F. Herreid,
prof. of biology, SUNY Buffalo

Gabor Hrasko,
chairman of the European Council of
Skeptical Organizations (ECSO), president
of Hungarian Skeptics

Michael Hutchinson,
author; Skeptical Inquirer
representative, Europe

Philip A. Ianna,
assoc. prof. of astronomy,
Univ. of Virginia

I.W. Kelly,
prof. of psychology, Univ. of Saskatchewan,
Canada

Richard H. Lange,
MD, Mohawk Valley Physician
Health Plan, Schenectady, NY

William M. London,
California State Univ., Los Angeles

Rebecca Long,
nuclear engineer, president of Georgia
Council Against Health Fraud, Atlanta, GA

John R. Mashey,
computer scientist/executive (Bell
Labs, then Silicon Valley), analyst of
climate-change denial, contributor to
DeSmogBlog and Skeptical Science,
Portola Valley, CA

Thomas R. McDonough,
astrophysicist, Pasadena, CA

James E. McGaha,
astronomer, USAF pilot (ret.)

Joel A. Moskowitz,
director of medical psychiatry, Calabasas
Mental Health Services, Los Angeles

Matthew C. Nisbet,
professor of communication studies,
public policy, and urban affairs at Northeastern University

Julia Offe,
neurobiologist, science journalist, creator
of German Science Slam

John W. Patterson,
prof. of materials science and
engineering, Iowa State Univ.

James R. Pomerantz,
prof. of psychology, Rice Univ.

Tim Printy,
amateur astronomer, UFO skeptic, former
Navy nuclear reactor operator/division
chief, Manchester, NH

Daisie Radner,
prof. of philosophy, SUNY Buffalo

Robert H. Romer,
prof. of physics, Amherst College

Karl Sabbagh,
journalist, Richmond, Surrey, England

Robert J. Samp,
assistant prof. of education and
medicine, Univ. of Wisconsin-Madison

Steven D. Schafersman,
asst. prof. of geology, Miami Univ., OH

Chris Scott,
statistician, London, England

Stuart D. Scott Jr.,
associate prof. of anthropology,
SUNY Buffalo

Erwin M. Segal,
prof. of psychology, SUNY Buffalo

Carla Selby,
anthropologist / archaeologist

Steven N. Shore,
prof. of astrophysics, Univ. of Pisa, Italy

Waclaw Szybalski,
professor, McArdle Laboratory, Univ.
of Wisconsin-Madison

Sarah G. Thomason,
prof. of linguistics, Univ. of Pittsburgh, PA

Tim Trachet,
journalist and science writer, honorary
chairman of SKEPP, Belgium

David Willey,
physics instructor, Univ. of Pittsburgh, PA

CENTERS FOR INQUIRY

www.centerforinquiry.org/about/branches

United States Branches

CFI Austin
Austin, Texas (512) 454-0977
austin@centerforinquiry.net

CFI Indiana
350 Canal Walk, Suite A
Indianapolis, Indiana 46202
(317) 423-0710
indy@centerforinquiry.net

CFI Long Island
Long Island, NY
(631) 793-9382
li@centerforinquiry.net

CFI Michigan
3777 44th Street SE, Grand Rapids, MI 49512
(616) 698-2342 michigan@centerforinquiry.net

CFI New York City
P.O. Box 26241, Brooklyn, NY 11202
nyc@centerforinquiry.net

CFI Northeast Ohio
PO Box 2379, Akron, OH 44309
(330) 798-0843
neohio@centerforinquiry.net

CFI Portland
PO Box 3378, Portland, OR 97208
(503) 593-7904
portland@centerforinquiry.net

CFI San Francisco
San Francisco, CA, sf@centerforinquiry.net

CFI Tampa Bay
Box 139 c/o O'Keefe
4011 S. Manhattan Ave., Tampa, FL 33611-1265
tampa@centerforinquiry.net

CFI Washington DC
1012 14th St. NW, Suite 205, Washington, DC 20005
(202) 733-5279 ext. 200
dc@centerforinquiry.net

CFI West
2535 W. Temple St, Los Angeles, CA 90026
(323) 666-9797, la@centerforinquiry.net

CFI Western New York
1310 Sweet Home Road, Amherst, NY 14228
(716) 636-4869 ext. 402
wny@centerforinquiry.net

International Branches

CFI Argentina
Los Antiguos, Santa Cruz Province,
Argentina
Alejandro Borgo
alejandroborgo@gmail.com

CFI Canada
PO Box 24006
Hazeldean RPO
Ottawa, ON
K2M 2C3
(613) 663-8198
info@centerforinquiry.ca

CFI China
China Research Institute for Science
Population
NO. 86, Xueyuan Nanlu Haidian Dist.
Beijing, 100081 China
8610-62170515
Zheng Nian
nzhjx@yahoo.com.cn

CFI France
Universite of Nice
Faculte Des Sciences
Parc Valrose, 06108
Nice Cedex 2, France
+33-489.15.02.28 (only on Wed. p.m.)
Henri Broch
Henri.Broch@unice.fr

CFI Kenya
Center For Inquiry–Kenya
United Youth Group House, Wing B
Makadara, Jogoo Road
Kenya
George Ongere
geongere@yahoo.com

CFI Peru
Calle El Corregidor 318
Urb. El Manzano, Rimac
Lima 25-PERU
Manuel Paz y Mino
humanarazon_peru@yahoo.com

CFI Poland
01-876 Warszawa
Ul. Broniewskiego 99/147
Poland
Andrzej Dominczak
dominiczak@wp.pl

CFI Spain
Madrid, Spain
Luis Alfonso Gamez
lgamez@terra.es

cfi
CENTER FOR INQUIRY

CSICON 2020
THE CONFERENCE DEDICATED TO SCIENCE AND REASON
WESTGATE HOTEL LAS VEGAS
SAVE THE DATE
OCTOBER 15–18, 2020
Stay TUNED FOR UPDATES
WESTGATE